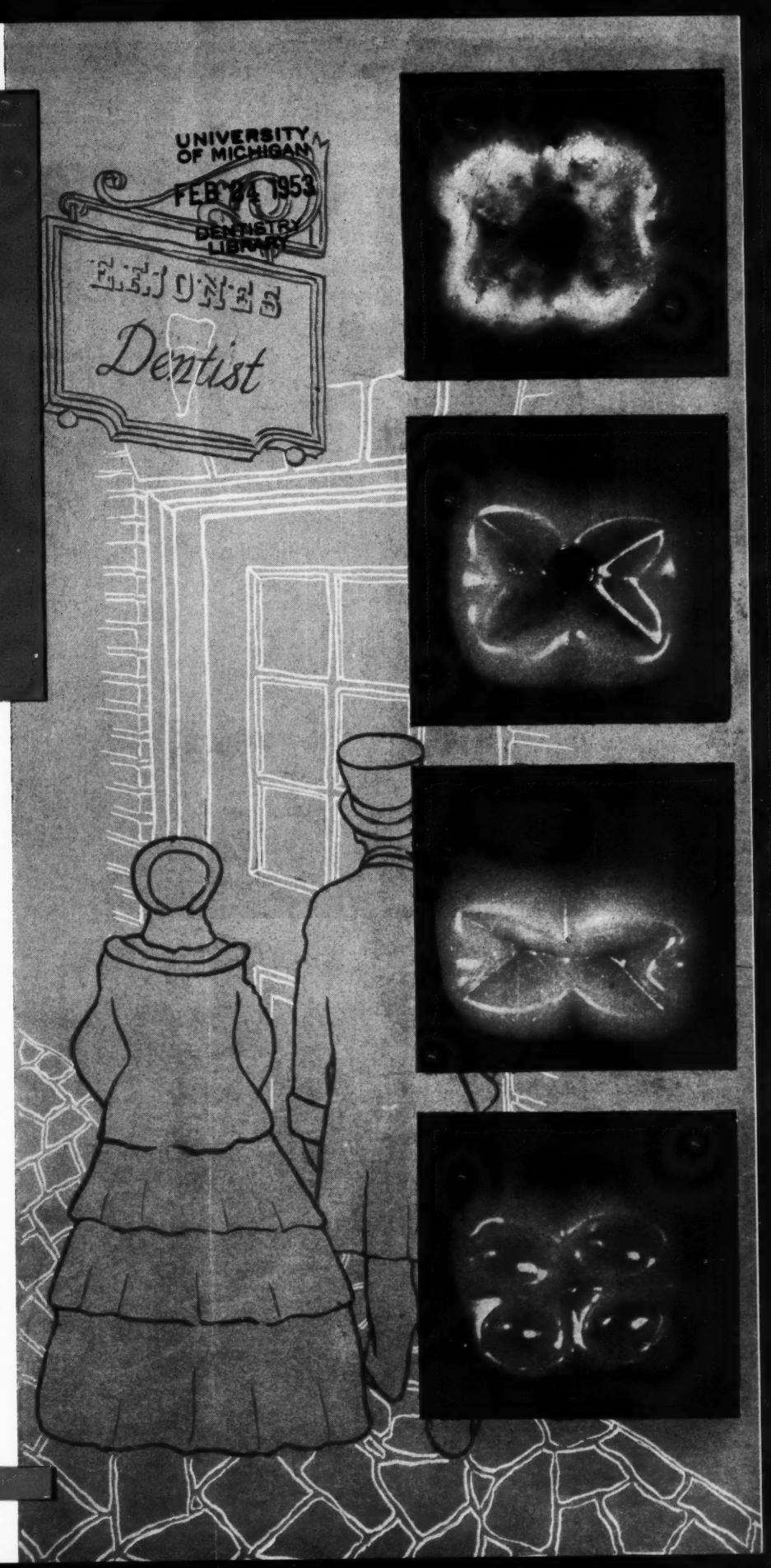
Dental Digest



February 1953

IN THIS ISSUE

Cover illustration—Craddock article, page 62

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These are a few of an almost unlimited number of Five-Phase Anterior personalized arrangements, easily made by transposing centrals, laterals and cuspids from different sets. They exemplify individuality and "living" esthetics not obtainable with any other teeth.

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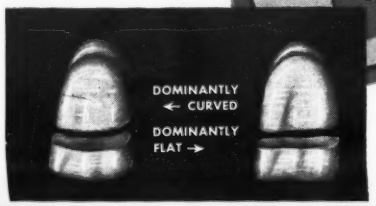
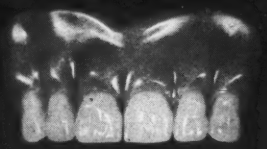


FREE *This helpful literature is available upon request:*

1. Illustrated Mold Chart
2. 60 Personalized Five-Phase Anterior Denture Arrangements
3. 32-page Book: Varied Labial Surfaces and Their Relation To Scientific Tooth Selection



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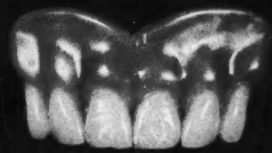
CUSPIDS L42 C



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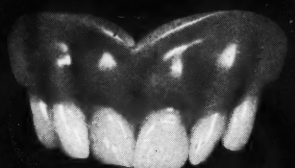

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CUSPIDS L42 C

FIVE-PHASE

ANTERIORS

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About Our CONTRIBUTORS

WAYNE S. PAULLUS, D.D.S. (University of Tennessee, College of Dentistry, 1943), is Vice-President of the American Academy of Implant Dentures, and his collaborator, JOSEPH T. GORDON, B.S. (Southwestern University, 1934), M.D. (University of Tennessee, 1938) present in their article, SURGICAL PROCEDURE FOR THE LOWER IMPLANT DENTURE, step-by-step directions for the completion of a highly specialized implant technique.

FREDERICK W. CRADDOCK, D.D.S. (New Zealand), M.S.D. (Northwestern University, Dental School, 1948) is engaged in teaching prosthetic dentistry. Doctor Craddock has contributed to dental literature since 1929 and is the author of a book, PROSTHETIC DENTISTRY, A CLINICAL OUTLINE, published by Mosby in 1951. His current article is a brief illustrated history, PORCELAIN POSTERIOR TEETH.

SIMON MYERSON, D.M.D. (Harvard University, Dental School, 1908) has spent thirty-five years in research relating to artificial teeth and prosthodontia and has originated improvements in artificial teeth which in several instances have resulted in permanent changes in this field. While writing has not been Doctor Myerson's chief interest, he has published rather consistently since 1930. For his first appearance in DIGEST he presents OCCLUSAL FORMS AND NATURE'S PLAN.

PHILLIP M. CHERNOFF, D.D.S. (The Thomas W. Evans Dental Institute, University of Pennsylvania, 1922) continues his discussion of surgery versus bacteriology in the treatment of pulpless teeth. In this, the second of a series of four articles on the subject, Doctor Chernoff surveys specifically the subject of apicoectomy.

EDWARD J. RYAN, B.S., D.D.S., Editor
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Surgical Procedure

for the LOWER IMPLANT DENTURE

W. S. PAULLUS, D.D.S., Miami, Florida, and
J. T. GORDON, B.S., M.D., Lewisburg, Tenn.

DIGEST

Since the year 1565 when Petronius is recorded as proposing the use of gold for repairing cleft palates, innumerable attempts have been made at implantation of metals and alloys into living tissue with various degrees of success. Interest in this technique continues and with experimentation the implant technique has improved until it is an accepted dental procedure in specified cases. This article presents a step-by-step technique for a lower denture implantation in which two surgical operations are included in completing the procedure.

Phenomena of Galvanic Action

To understand the successful reaction of some metals and the failure of others when used as implants, some of the basic phenomena of galvanic action must be understood. When dissimilar solids are in contact a voltage, or difference of potentials, exists. Metals, in particular, exhibit this characteristic. Potentials also exist between metals and electrolytes (any conducting liquid, one of which might even be human tissue fluid). To create galvanic action, two elements or poles must be in contact through an electrolyte. The current is furnished by the chemical activity between the electrolyte and the element.

Tissue Fluid can act as Electrolytic Fluid—The electromotive force is determined by the kinds of metals and the character of the electrolyte. It must be remembered that tissue fluid can act as an electrolytic fluid; to place a corrosive metal, therefore, into an electrolytic tissue fluid would create a wet cell which could destroy the elements and tissue.

Inert Substances Approved — The subcommittee of fractures of the American College of Surgeons has endorsed the following metals or alloys for use on internal fixation of fractures:

1. Vitallium,® a homogeneous alloy composed of approximately 65 per cent cobalt, 30 per cent chromium, and 5 per cent molybdenum. Appliances made from this substance are completely tolerated by human bone and tissue. They set up no "foreign body" reaction, are nonelectrolytic, and completely inert in situ. All such appliances are cast but can be bent to meet operative requirements.

2. Tantalum, a base element, inert in body tissue but relatively soft. The disadvantage of this metal lies in the extreme difficulty of producing it, which consequently makes it costly. Tantalum can be drawn or rolled but cannot be cast.

3. Eighteen-8 SMO, a stainless steel which is 18 per cent nickel, 8 per cent chromium, 2 to 3 per cent molybdenum, and the remainder iron, manganese, and carbon. With this agent there is less pit corrosion and less electrolytic activity than with the ordinary 18-8 stainless steel. The disadvantage of this alloy lies in the fact that although it is slow, there is a minute galvanic action which over a long period of time may produce tissue irritation.

Action of Electrolytic Tissue Fluid on Metal—The problem is not how metal will affect the tissue, but rather what effect the electrolytic tissue fluid will have on the metal which may possibly cause disintegration within the tissue. The amount of tissue damage is roughly equivalent to the amount of galvanic action that takes place between the metals and the tissue fluid.

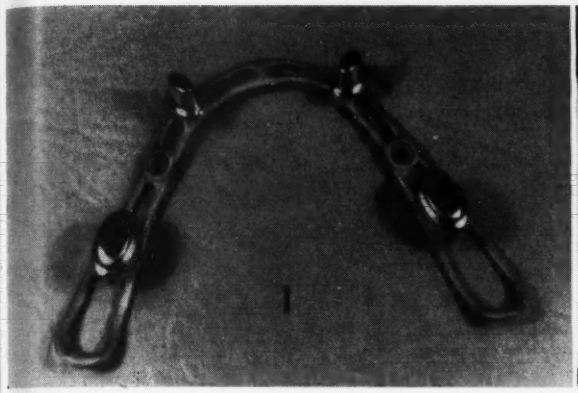
Electrical force is generated when different metals are placed in tissue by the creation of a wet cell. The amount of current is proportional (1) to the difference in potential of metals at the poles, (2) the degree in which they are acted upon by the given electrolyte, and (3) the distance between the poles. Vitallium is completely inert.

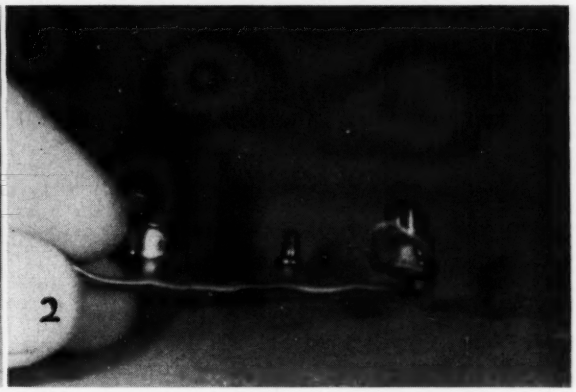
Description of Implant

The lower implant consists of two parts: (1) The fixed part, a horseshoe-shaped framework (Fig. 1) which is cast to fit a model of the superior surface of the body of the mandible obtained (a) by a direct impression of the bone, or (b) by an indirect impression obtained by using x-rays and trimming the stone model. Arising from the framework are four abutments which protrude into the oral cavity. Two abutments are placed in the molar area and two in the cuspid area (Fig. 2). The framework is secured to the bone by means of two small screws in the bicuspid area. (2) The removable part consists of a removable bridge which clasps the four protruding abutments (Figs. 3 and 4).

Implant Technique

The technique presented consists of two operations (1) a procedure for obtaining an impression of the superior surface of the body of the mandible, and (2) an operation for





1. ***The implant.***
2. ***Two abutments are placed in the molar area and two in the cuspid area.***

the placement of the implant.

Indications for an Implant—In the presence of the following conditions the implant technique is indicated:

1. Torus mandibularis.
2. High muscle attachments.
3. Flabby soft tissue overlying a flat ridge.
4. A flat ridge where no reasonable degree of retention can be obtained by a conventional denture.
5. Cases where conventional dentures have been given a fair trial and are not tolerated for one reason or another.
6. Sharp spiny projections on a flat ridge.
7. A request for the implant denture by the patient.

Contraindications—The lower implant procedure is not recommended in the following situations:

1. In the presence of any general debilitating disease.
2. In the presence of any blood dyscrasias.
3. Mouths of recent extractions. At least eighteen to twenty-four months should elapse after extractions before establishing the lower implant.
4. Patients who only half-heartedly want an implant.
5. Remote latent infections.
6. Stomatitis.
7. Regional inflammatory complications.
8. Presence of any foreign body in the mandible.
9. Acute thrombotic vascular complications.
10. Patients with a high coagulation and bleeding time.
11. A patient to whom the experimental nature of the project has not been explained.

Initial Measures—At the first office visit the following procedure should be followed:

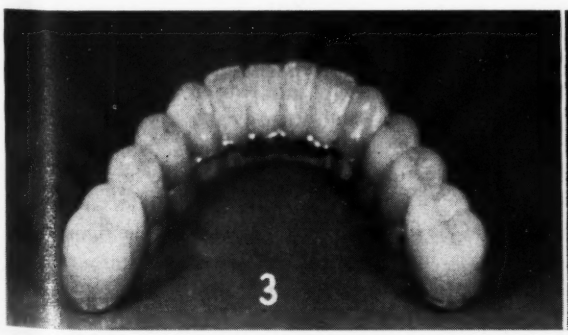
1. A complete history is obtained.
2. Urinalysis.
3. A complete blood examination: bleeding time, coagulation time, hemoglobin count, red blood count, white blood count, and differential, a serum calcium, and serum phosphorus study.
4. Full mouth, intraoral, occlusal, and lateral plate x-rays are taken.
5. An impression of the lower ridge is taken in compound or colloid.

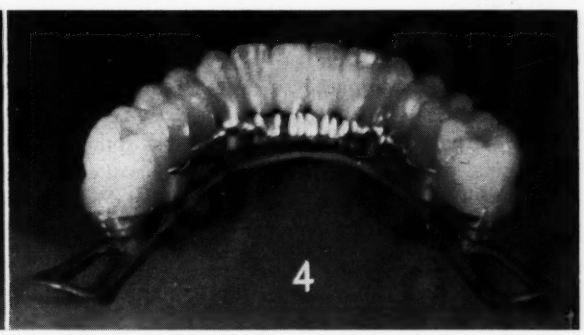
Laboratory Procedure — From the impression taken at the first visit a model is obtained in stone and an acrylic or a metallic tray is made to cover only the area the implant will occupy on the mandibular bone (Fig. 5). A metallic tray is much easier to handle and may be sterilized by boiling.

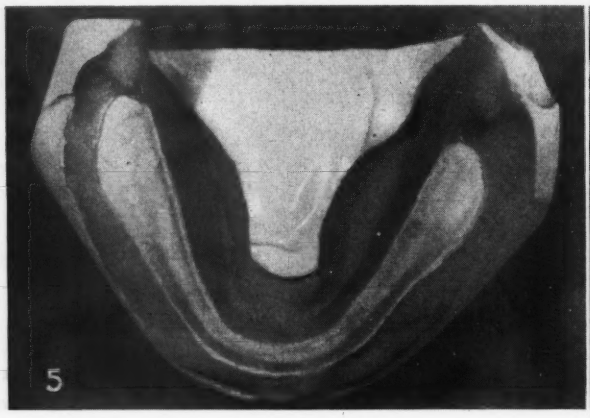
Method for Preparing Tray—1. The posterior extension should extend to the middle of the retromolar pad areas.

2. The buccal extension of the tray should take advantage of the external oblique ridge, covering the fossa between the external oblique ridge and the crest of the ridge. The tray outline is carried forward superior to the mental foramen being careful to avoid the foramen.

3. ***The removable bridge.***
4. ***The removable bridge placed on the implant outside the mouth.***







5. ***Outline of the acrylic or metal tray for taking an impression of the superior surface of the mandible.***
6. ***The acrylic tray with compound added to the under surface.***

3. The lingual extension should not extend quite to the superior internal border of the mandible on the entire lingual border of the mandible. The implant will function, however, if overextended.

4. A handle is placed in the anterior midline.

Impression of Mandibular Bone Obtained—At the second visit, surgical procedure for obtaining an impression of the superior surface of the mandibular bone is completed.

Armamentaria Required—The following agents have been found to be necessary:

1. Pantopon, grain ⅓, or demerol, 100 milligrams.
2. Nembutal, grains 1½; atropine, grain 1/100.
3. A syringe and procaine 2 per cent (three carpules).
4. Metaphen.
5. Boiled water, cooled to 115 degrees Fahrenheit.
6. Acrylic or metallic impression tray prepared as described (Fig. 6).
7. Low fusing compound.
8. Gas flame or alcohol torch.
9. Scalpel, Number 15.
10. Periosteal elevator.
11. Curets.
12. Rongeurs.
13. Bone files.
14. Carborundum stones or acrylic burs.
15. Suture thread and needle (gastrointestinal surgical cotton, USP, 30 inches with single atrolac eyeless needle 000).
16. Needle holder.
17. Hemostat.
18. Tissue forceps.
19. College pliers.
20. Surgical burs.
21. Sterile gauze sponges.
22. Zephiran chloride and tray (an acrylic tray cannot be boiled).
23. Penicillin, 600,000 units.
24. Mouth mirror and retractors.

Premedication—1. Penicillin, 600,000 units.

2. Nembutal, grains 1½, and atropine, grain 1/100 (administered one hour before surgery).

3. Pantopon, grain ⅓, or demerol, 100 milligrams (administered thirty minutes before surgery).

Anesthesia—Procaine 2 per cent is used on a right and left mandibular block, followed by a right and left long buccal injection.

Overextension Reduced—The acrylic tray is tried on the ridge. If overextended on the lingual or buccal it is trimmed.

Surgical Procedure

Three incisions (Fig. 7) are made in the following manner:

1. An incision is made along the crest of the ridge from the retromolar pad area to the retromolar pad area on the opposite side.

2. At the posterior extent of the first incision a lateral incision is made from the superior internal border of the mandible to the external oblique ridge on both the right and left retromolar pad areas.

3. In the anterior midline another incision is made at right angles to, and across, the original incision from lingual to labial about 8 to 10 millimeters in length.

Elevation of Mucoperiosteum—The tissue is elevated to the extent of the coverage of the tray.

Tissue Flaps Secured—The buccal and labial tissue flaps are sutured to the cheek and lips to improve vision for taking the impression.

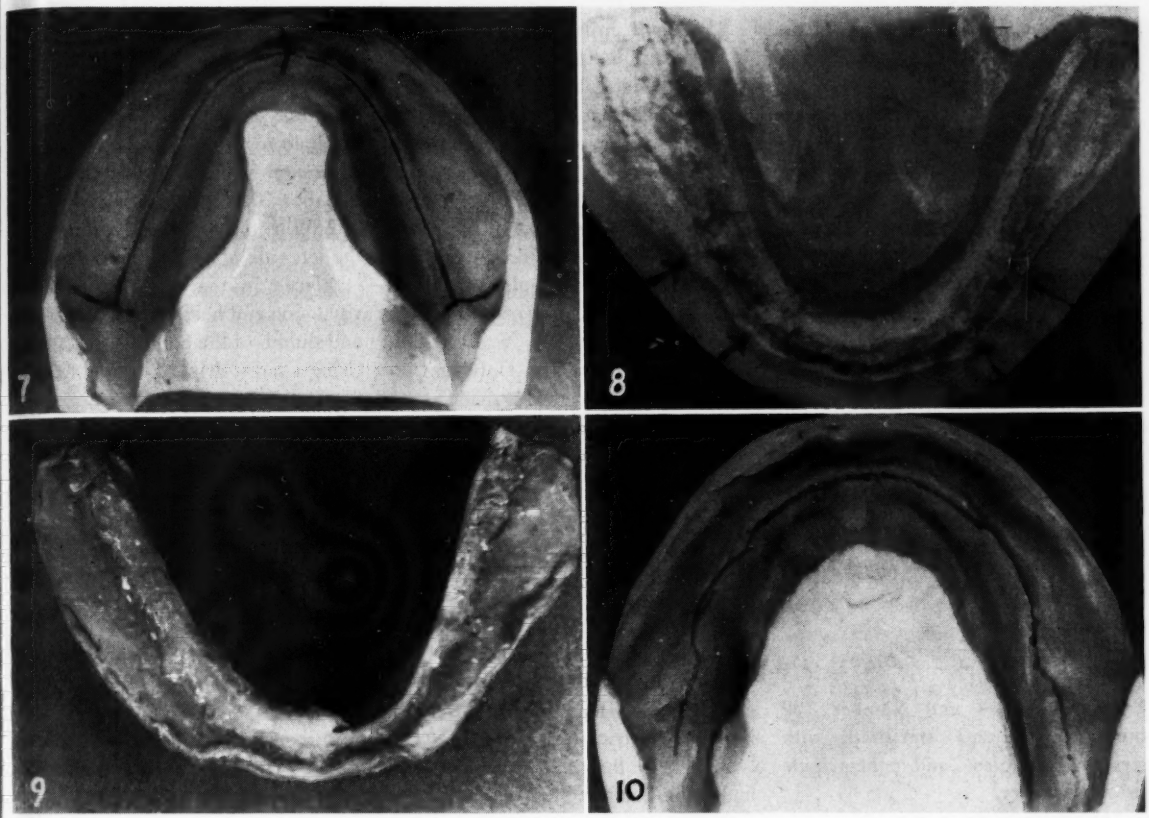
Tray is Tried on Ridge—Lingual tissue may be retracted with tissue forceps and curets. Check tray to see that it is not overextended.

Trimming of Bone—1. Removal of sharp spiny ridge, alveolectomy, and removal of any bony growth, if necessary, may be done.

2. In the bicuspid area, make a slight trench in the cortical layer of bone (Fig. 8) from the lingual extent of the implant to the buccal extent. The depth of the trench is only 1 millimeter (the purpose of the trench is to countersink to allow for the head of the screw over which tissue might be put under tension if relief were not afforded).

3. A pit is made in the position that the two cuspid posts will occupy. This pit, 2 millimeters in depth, is made with a surgical bur which is equivalent to a Number 7 round bur. This will facilitate the placement of the implant because a definite seat is provided for centering the implant on the ridge. Bone chips are removed with curets.

Obtaining Impression of the Bone,



7. ***Outline on the model of incision to be made in the mouth.***

8. ***Model showing (1) trenched area in the bicuspid area, and (2) pits in the cuspid area. This is a model of the superior surface of the mandible onto which the implant will be cast.***

9. ***Impression of the bone obtained by means of an acrylic tray and low-fusing compound.***

10. ***One incision is made for placing the implant.***

Figure 9—Low fusing compound is chosen as an impression material. The following steps are taken:

1. Over a gas flame heated compound is added to the tray.

2. The compound is tempered in previously boiled water and allowed to cool to 115 degrees Fahrenheit.

3. The material is touched to the patient's upper lip for tolerance.

4. The tray is placed in position on the ridge and pressure is applied to the bicuspid area. Care is taken to be sure there is no soft tissue underneath the compound.

5. The tray is chilled and removed.

Thickness of Tissue Measured — The sutures are removed from the buccal and labial flaps. The thickness of the tissue overlying the bone is recorded so that the laboratory technician will know how far above the implant to build the abutments.

Coaption and Suturing of Tissue— 1. Simple interrupted sutures are usually sufficient in the posterior section. However, in certain instances where muscle attachments of the lips and tongue are high and mobile, vertical-on-end mattress sutures should be used in the cuspid-to-cuspid area.

2. Gastrointestinal surgical cotton, USP, 30 inches, is used with single atrolac eyeless needle 000.

Postoperative Care—The following postoperative measures are advised:

1. Complete bed rest or hospitalization for at least twenty-four hours.

2. An ice collar applied to cheek and neck.

3. Liquid diet.

4. Narcotics for pain, as prescribed.

5. Warm saline mouthwash after meals.

6. Gentian violet, 2 per cent, should be applied to sutures daily.

7. Sutures are removed three to seven days after surgery.

Impression is Poured—The impression is poured in stone (Fig. 8) and forwarded to the laboratory with the following information:

(a) The depth of the tissue overlying the bone.

(b) The intraoral x-rays taken before surgery.

Implantation Technique

Surgical procedure in the placement of the implant is usually completed within three to four weeks after the impression is made. Waiting longer may permit a subperiosteal tissue

growth which will affect the fit of the implant to the bone. The implant is examined carefully when it is returned from the laboratory. If there is excessive bulkiness of metal, it is relieved, particularly around posts and screw holes.

Armamentaria Required for Implantation—1. For premedication the following agents are useful: (a) Penicillin, 600,000 units. (b) Nembutal, grains, 1½, and atropine, grain, 1/100. (c) Pantopon, grain ⅓, or demerol, 100 milligrams.

2. Implant and screws.
3. Screw driver.
4. Scalpel, Number 15 (Bard Parker).
5. Metaphen.
6. Syringe, and procaine 2 per cent (3 carpules).
7. College pliers.
8. Periosteal elevator.
9. Curets.
10. Number 4 and Number 702 burs (1½ dozen) sterilized, with straight handpiece and contra-angle in oil sterilizer.
11. Sterile gauze sponges.
12. Suture needle and thread (gastrointestinal surgical cotton, USP, 30 inches, with single atrolac eyeless needle 000).
13. Needle holder.
14. Scissors.
15. Tissue forceps.
16. Plastic instrument.
17. Indelible pencil and alcohol.
18. Surgical burs.
19. Sterile towels.
20. Number 10 diamond stone.
21. Mouth mirror and retractors.

Sterilization—1. Burs and handpieces are sterilized in hot oil.

2. The implant and screws are scrubbed with soap and water and boiled.

3. Cutting instruments are placed in a cold sterilizing agent. Other instruments are boiled or autoclaved.

Anesthesia—Mandibular block and long buccal blocks are made on each side.

Incision, Figure 10—Only one incision is made and that is made along the crest of the ridge from retromolar pad to retromolar pad area. The incision is curved to the points previously determined and marked with an indelible pencil, the object being to place the line of incision over as little metal as possible.

Elevation of the Mucoperiosteum—1. With a periosteal elevator, the tissue is retracted. Be sure the tissue is completely elevated in the space the implant will occupy.

2. Be sure that no soft tissue is left under the implant.

3. Granulation tissue is removed in the prepared pits and grooves in the bicuspid and cuspid areas with curets.

Implant Placed in Position on Ridge—1. The implant is centered into the prepared grooves and pits. 2. Curets and tissue forceps are used to hold the tissue out of the way.

Insertion of Screws in Bicuspid Area—With the implant in position on the ridge and securely held, the starting holes are made:

1. On the right side starting holes are made with a Number 4 round bur through the cortical layer of bone. The hole in the bone is centered in the hole for screws in the implant. If necessary, it may be enlarged with a Number 702 bur.

2. With the assistant holding down the left side of the implant, the screw is placed in the screw hole on the right side and held with the forefinger and thumb of the operator's left hand. Using a screw driver, proceed to screw down, but not completely down. This will be done after the left screw is secured.

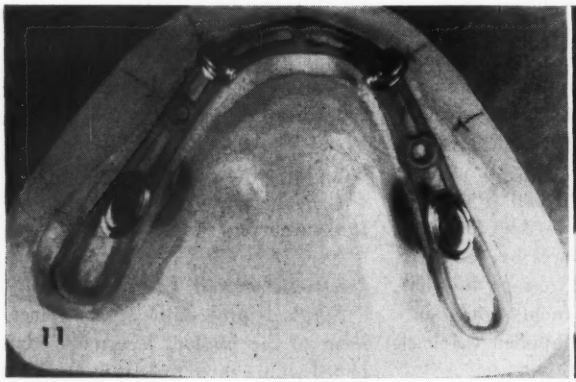
3. The left screw is fastened in a similar manner. The remaining turn on the right side is then completely screwed. (Care should be taken not to strip the bone with the screws.)

Sutures—Only vertical-on-end mattress sutures are used. Sutures are first placed mesial and distal of each abutment. As many more sutures as are necessary are then placed. Tissue is tucked under the abutments with a plastic instrument (Fig. 12). Postoperative treatment is the same as that following the first operation.

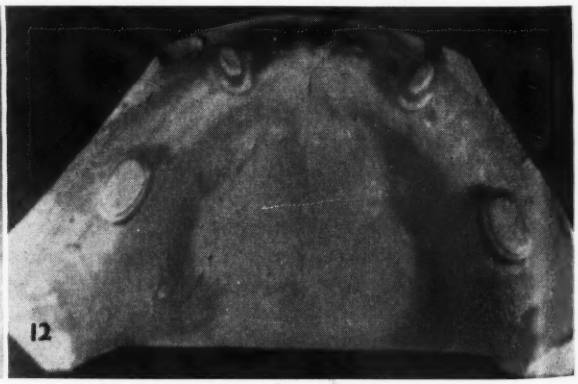
Possible Postoperative Conditions

1. Swelling of a transient nature which usually lasts one to three days. If severe, treat with 500 cubic centimeters, 1/10 of 1 per cent procaine every three hours intravenously.

2. Discomfort which may be experienced the first and second day after implantation.



11. *The implant centered on the model into prepared pits and grooves as it should be centered in the mouth.*



12. *A model taken from a patient with an implant in the mouth.*

3. Mild discomfort may be experienced on the third day.

4. The sutures may pull through the tissue and part of the implant may be visible. Relapse of tissue should not give concern. Keep the alloy clean and apply tincture of benzoin over the surrounding soft tissues and the implant.

5. If the implant is overextended to the lingual, it will work through the soft tissue.

6. If the implant is placed on a ridge that is too sensitive, it may work through the soft tissue.

7. Penicillin reactions, if allergic, may cause an edematous condition, resulting in exposure of the implant. (A) In cases of mild reaction, treat with antihistamines. (B) In severe cases, treat with cortisone under medical supervision in the following dosage: 100 milligrams every eight hours for 3 doses; 100 milligrams every twelve hours for 2 doses; 100 milligrams daily.

8. The screws may be exfoliated. The screws are not important a month after implantation. The use of screws may be compared to that of sutures; they are not needed after healing takes place. The removal of the screws is a simple procedure which may be completed without anesthesia. Tissue will fill in the space occupied by the screws.

9. If the implant is not in close proximity to the bone, it may work through the tissue.

10. Should ecchymosis develop it may be treated with 1 cubic centimeter of water soluble extract of corpus luteum or koagamin, 2 cubic centimeters, every three hours intramuscularly.

11. Resorption of bone under the implant is of no immediate concern provided the implant is entirely encapsulated.

Completion of Technique

Six to eight weeks after implantation the technique is completed in a manner similar to the method used in dealing with an upper denture and a lower partial construction.

Comments

1. The alloy Vitallium is inert in human tissue and possesses no galvanic action. It may lie dormant in human tissue indefinitely, producing no irritation in bony or soft tissue.

2. Whether placed into cancellous or into cortical bone, the appliance is surrounded by a fibrous pad of tissue that adheres tenaciously to the appliance. This pad would seem to be sufficient to withstand the stresses of mastication.

3. The implant should definitely not be placed on unhealed ridges as this will result in exfoliation. Such exfoliation, however, is usually painless.

Conclusion

The actual implantation of the lower implant denture may be successfully completed by taking an impression of the bone and performing a second operation to insert the implant. This technique may be accomplished with a minimum of risk provided the appliance is in close contact with the bone and sound surgical judgment is used in the preoperative, operative, and postoperative procedures.

1102 *Huntington Building.* (WSP)
Gordon Hospital. (JTG)

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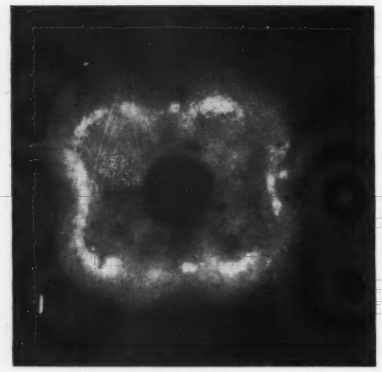
The FORMS *of Porcelain Posterior Teeth*

F. W. CRADDOCK, D.D.S., Dunedin, New Zealand



1. *This example antedates the discovery of vulcanite by many years. It is a tube tooth intended for attachment to a metal base. The porcelain is imperfectly glazed and the carving is rudimentary. Made in England by Claudius Ash in the period 1750 to 1800.*

DIGEST

Although the illustrations in this article, which have been selected from a comprehensive collection of the author's, are arranged in chronologic order, the dates assigned are only approximate. The purpose of the article is not to establish priorities of invention or to illustrate every important design, but to present a condensed pictorial history which will show general trends in tooth forms.

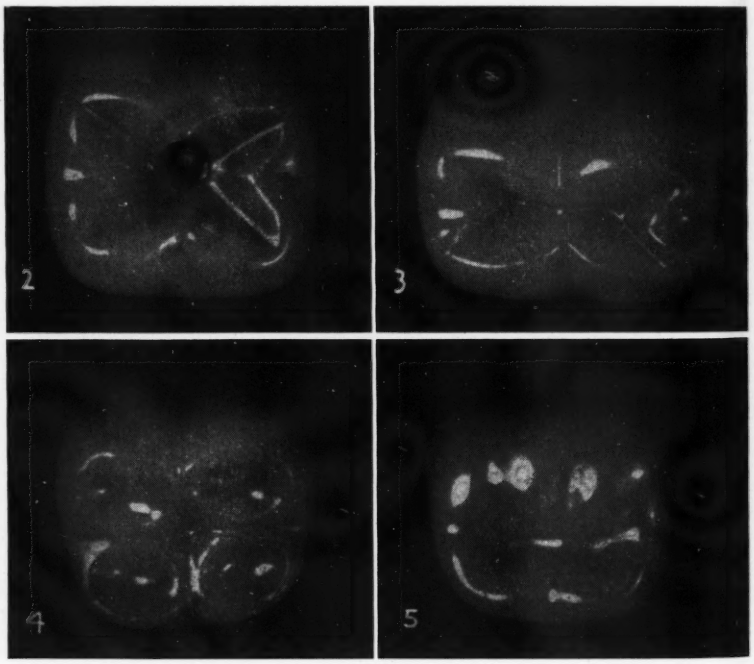
Tooth Forms not a Recent Invention

It is generally assumed that cuspless, mechanical, or nonanatomic posterior tooth forms for full dentures are a modern invention, dating from about the 1920's. They are, in fact, extremely old. Moreover, some of the early forms bear a striking resemblance to recent designs. For example, it may surprise many readers to know that an "inverted cusp" tooth quite similar in design to Hall's was manufactured and marketed in 1859 (Fig. 4).

Examples of Occlusal Patterns

From an extensive collection of teeth in the author's possession a number of representative examples of

(*Continued on page* 70)

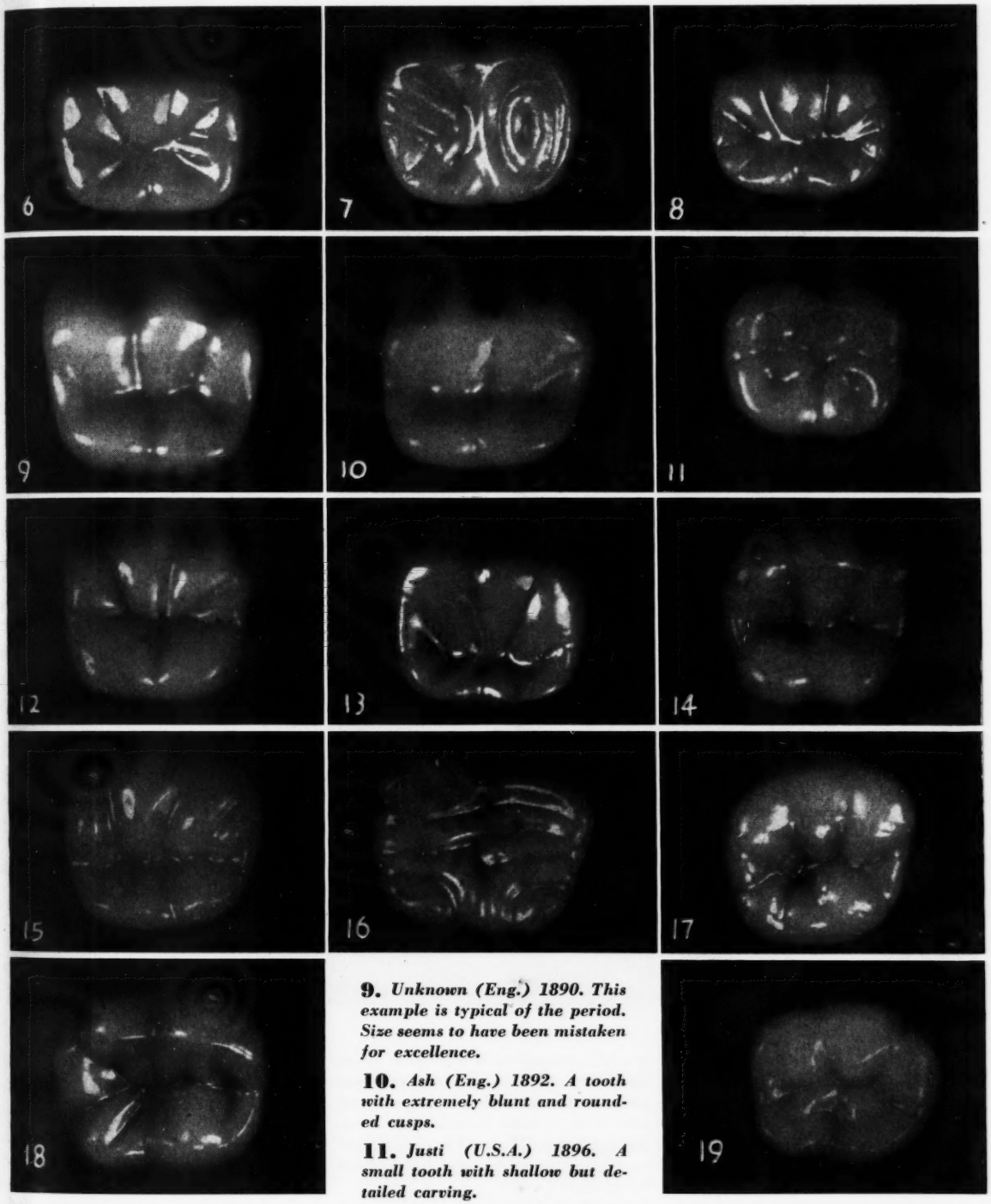


2. *Ash (Eng.) 1856. The porcelain is of fine quality and highly glazed. The tube is lined with platinum. The tooth is notably square in its proportions and has diagonal grooves rather than cusps.*

3. *Ash (Eng.) 1858. This is the earliest example in the collection of a diatoric tooth having a retentive hole for attachment to vulcanite.*

4. *Ash (Eng.) 1859. An inverted cusp tooth differing from Hall's design mainly in having four instead of two depressions.*

5. *Ash (Eng.) 1860. An early anatomic type having square proportions and broad, flat cusps.*



6. *Ash (Eng.) 1880. An early example of narrow buccolingual width.*

7. *Ash (Eng.) 1881. A cuspless or nonanatomic tooth with an occlusal pattern of extremely shallow concentric and diagonal grooves.*

8. *D. M. Co. (Eng.) 1886. A more anatomic carving in the same proportions as those in Figure 6.*

9. *Unknown (Eng.) 1890. This example is typical of the period. Size seems to have been mistaken for excellence.*

10. *Ash (Eng.) 1892. A tooth with extremely blunt and rounded cusps.*

11. *Justi (U.S.A.) 1896. A small tooth with shallow but detailed carving.*

12. *D. M. Co. (Eng.) 1900. A variation of the type shown in Figure 10.*

13. *D. M. Co. (Eng.) 1900. A perversion of anatomic carving, the median groove being displaced to the lingual side.*

14. *DeTrey (Eng.) 1905.*

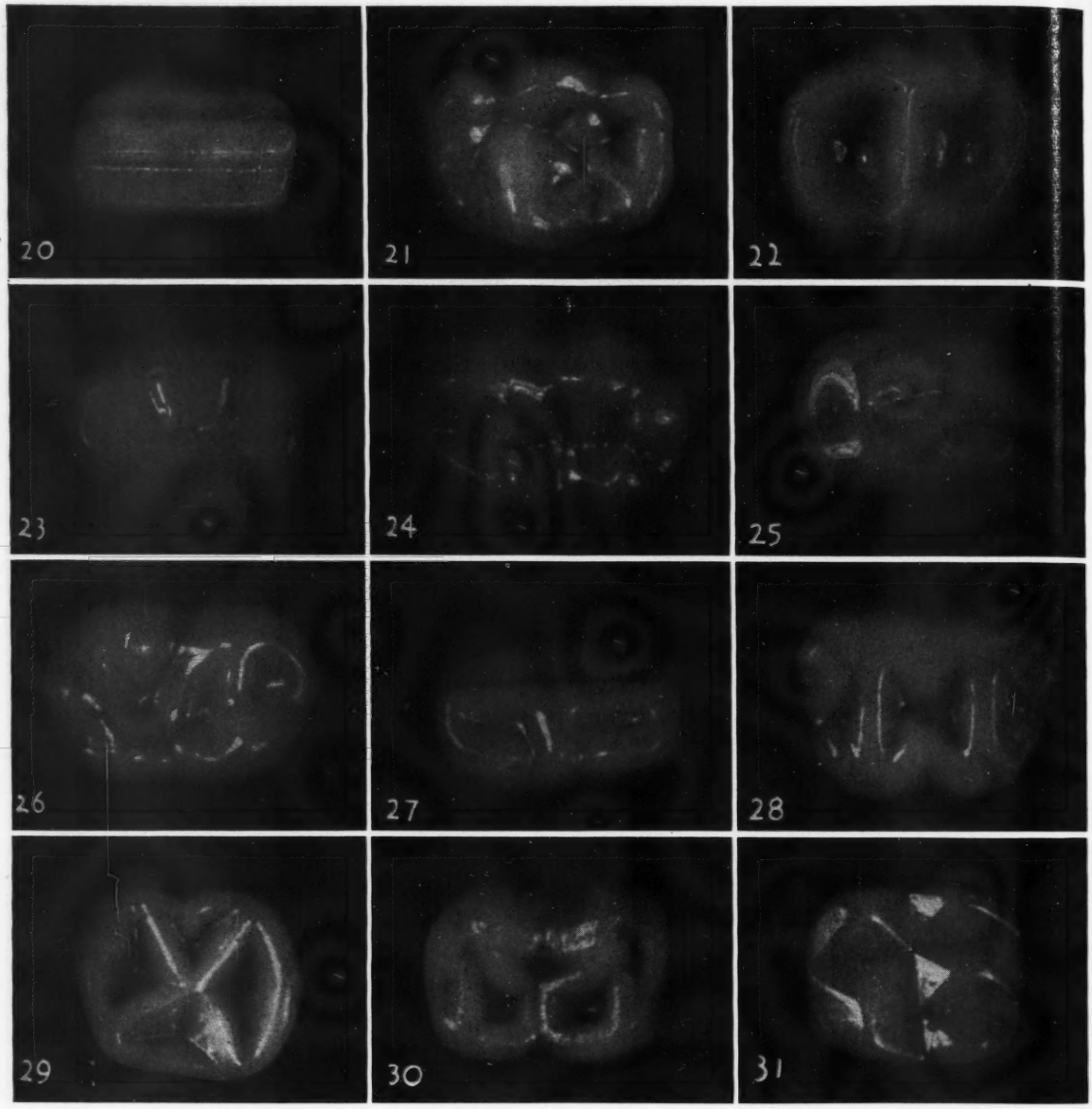
15. *Ash (Eng.) 1907.*

16. *D. M. Co. (Eng.) 1910. A cuspless tooth having small, shallow ridges.*

17. *DeTrey (Eng.) 1910. A precursor of the true anatomic types.*

18. *Trubyte (U.S.A.), and Anatoform (Eng.) 1911. The anatomic type of carving brought to perfection.*

19. *DeTrey (Eng.) 1902. A less detailed anatomic carving.*



20. *Sears' Channel (U.S.A.) 1927. The earliest of the modern nonanatomic types. Its main characteristics are (1) narrow total buccolingual width, (2) narrow and flat food table, and (3) wide escape-ways. The upper molar has shallow buccolingual cusps but no anteroposterior cusps.*

21. *Gysi Cross Bite (U.S.A.) 1928. An anatomic carving ingeniously modified to meet the special needs of cross bite occlusion. The median groove is displaced toward the buccal, the long lingual slopes providing the working surfaces.*

22. *Hall Inverted Cusp (U.S.A.) 1931.*

23. *Vita Teleoform (Germany) 1933. A wedge-shaped tooth having, in effect, buccolingual inclines but no anteroposterior inclines. Shallow grooves are intended to increase shearing efficiency.*

24. *Ash Free Plane (Eng.) 1933. An anatomic type of deliberately decreased buccolingual width.*

25. *Fish Nutec (Eng.) 1934. A tooth which is small in all dimensions and almost cuspless.*

26. *Volite (U.S.A.) 1935. Similar to Figure 24.*

27. *French (U.S.A.) 1935. A nonanatomic type of narrow total buccolingual width, the food table being confined to the lingual two-thirds.*

(Continued on page 70)

28. *D. M. Co. (Eng.) 1936. A cuspless tooth having transverse ridges.*

29. *Vita Abrasion (Germany) 1936. The occlusal surface is convex buccolingually. The design is based on severely abraded natural teeth. Sharp ridges and deep fossae are provided for shearing.*

30. *New Trubyte (U.S.A.), and Solarex (Eng.) 1936. A modified anatomic type in which relatively low cusp angles and natural appearance are combined with an efficient mechanical arrangement of grooves and ridges.*

31. *McGrane (U.S.A.) 1940. A distinctly geometric pattern.*

OCCLUSAL FORMS

and Nature's Plan

SIMON MYERSON, D.M.D., Waban, Mass.

DIGEST

This article discusses the way in which the basic anatomic principles underlying the structure of natural teeth have been applied in the design of artificial teeth. The discussion is primarily concerned with posterior teeth and their function, and describes five structural specifications and two positional specifications which have been evolved to meet the special problems encountered in achieving satisfactory function with artificial posterior teeth.

General Comments

To avoid confusion the terms "nature" and "natural" are assumed in this article to exclude man's developments and improvisations.

As far as we know nature did not plan a third dentition for man in case of failure of the second. Nature's only plan would seem to have been to make use of imperfect, carious teeth and infected roots as they occurred. Some might die from infection or from malnutrition, but many survived long enough to reproduce and to ensure the survival of the species, fulfilling nature's chief concern or objective.

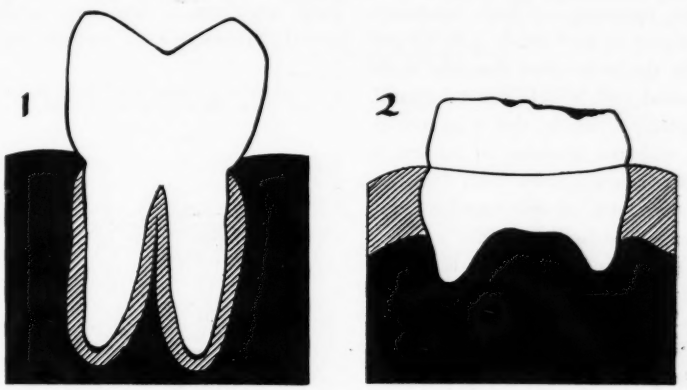
Example Formed by Nature—The whole art and practice of medicine and dentistry are directed toward correcting or alleviating the failures and breakdowns of nature and the dentist and physician are always concerned with the individual. So admirable is nature's architecture, however, that it should be studied closely and the examples of nature should be adopted as far as possible.

Highly Coordinated Mechanism—Man's masticating mechanism is a unit made of many interdependent and cooperating parts. For the cutting and grinding units nature developed for man and many other animals a type of dentition with cuspated teeth having long roots; in man roughly 50 per cent longer than the exposed crown. These long roots, with their special attachment to the alveolar process, are necessary to meet the stresses of mastication when there are interdigitating cusps and consequently great horizontal stresses (Fig. 1).

Principles Involved in Vertical Stress

In animals where stress is exerted mainly along the vertical axis of the teeth, the roots are quite different from the roots of human teeth. In some ruminants the roots are short, the base is broad, and there is little insertion into bone (Fig. 2). From this the deduction is obvious that since dentures lack the security of long roots, the stress should be chiefly vertical. To support a load in the vertical direction downward requires mainly sufficient base area. To meet a horizontal pull will require depth of anchorage as well as suitable thickness.

Principles Illustrated—The physical principles involved in these two types of teeth may be illustrated in the following way: If a force is vertically directed, downward, for exam-



1. ***Human tooth showing strong deep attachment necessitated by interdigitating cusps.***

2. ***Tooth of ruminant, showing nearly flat occlusal surface and flat root attachment.***

ple, its support need have only *sufficient area* to resist the downward force. If there is to be lateral force as well as vertical force, the base must be embedded into the supporting structure to a depth dependent on force multiplied by the height at which the force is applied. Figure 3 shows a ten-ton load resting on a broad platform with little depth. Figure 4 shows a pole driven deep into the ground in order to sustain a horizontal pull.

Nature's Forms for Noninterdigitating Teeth—Since nature uses interdigitating cusp teeth *only* when there are long roots firmly embedded in bone to support them, this example should be followed in artificial dentures. The interdigitating cusps of natural teeth are, therefore, contraindicated. Thus nature provides the model for rootless teeth with noninterdigitating occlusal structures. Since there are nowhere in nature conditions identical to those in the edentulous patient, specifications must be provided to meet existing requirements in accordance with sound engineering principles.

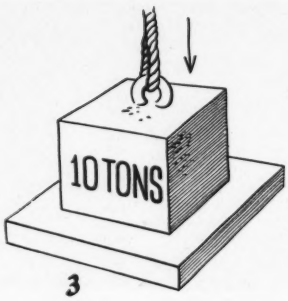
Basic Specifications

Because this discussion primarily concerns posterior teeth, the following five basic specifications are offered for artificial posterior teeth, together with the reasons for their acceptance:

Specification One

No Interdigitating Cusps—This means opposing occlusal structures that move on each other without pull on the dentures other than the slight frictional pull, which is not harmful. As noted previously, this is in accordance with the teaching of nature. It is also in accordance with logistics. The dynamics of this condition are demonstrated in Figure 5.

If the pairs of blocks, A, B, and C, in Figure 5 are held together with a force of twenty pounds, it is obvious that interference with lateral motion will be greatest with the first pair, less with the second pair, and least with the third pair. In the case of the last pair, there will be only frictional resistance.



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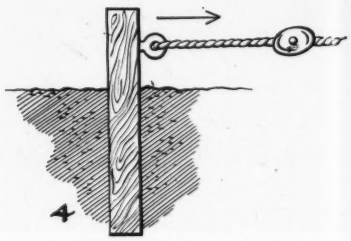

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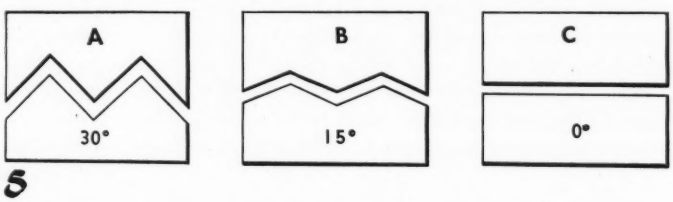
3. ***Illustrating the type of support required to meet vertical downward pressure.***
4. ***Illustrating the type of support required to resist horizontal pull.***

Problems Caused by Interdigitating Cusp Teeth—In a recent article in DENTAL DIGEST[1] the following statement was made concerning interdigitating cusp teeth: "In carving modern artificial teeth the designers used as models the magnificent crown formations of nature. Unaccountably, however, a number of serious problems developed." Referring to the type of teeth which move laterally without cusp interference, the same author stated: "Reduction of normal cuspal interference and an increase in patient comfort." These two statements are well supported by clinical experience.

Usefulness of Pain—Unfortunately, the author makes the questionable inference that the pain and trauma caused by cusp teeth are useful and presumably, therefore, should not be eliminated. He would seem to overlook the fact that the pain has served its purpose by giving the signal that something is wrong in a manner similar to aching toes under the pressure of tight shoes. This author states fur-

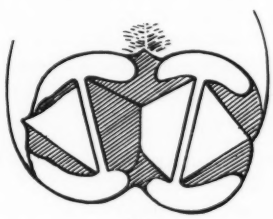


5

5. ***Diagrammatic illustration of decreasing resistance to lateral motion as cusp interference is lowered and eliminated.***

[1]Page, Harry L.: Centric and Plane Occlusion, DENTAL DIGEST **58**:210-212 (May) 1952.

6



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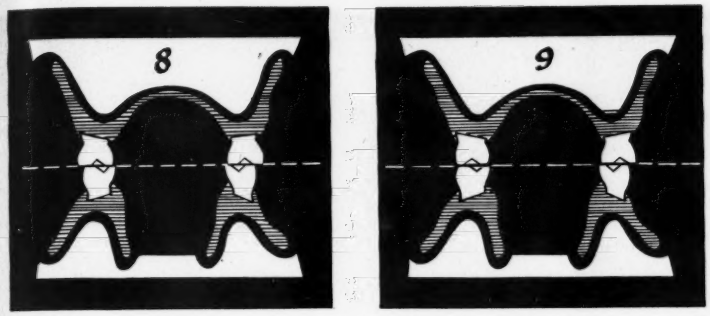
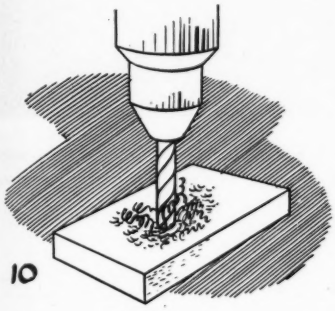
6. ***Small penetrating areas are shown along the perimeter of this tooth and on the transverse cutters.***
7. ***This illustration is similar to Figure 6 except that there are flat masticating areas buccally and lingually.***



8. ***Illustrating structure permitting closure of mandible with minimum force. Teeth in centric relation. Dotted line indicates horizontal transverse plane.***
9. ***Same as Figure 8 with masticating areas in opposition during lateral excursion.***



10. ***The principle of clearance is illustrated in the common twist drill at work.***

ther: "Flattened or modified cusps will unquestionably increase patient comfort." This would seem a convincing argument that the cause has been removed.

Specification One is supported by the most valid of all proof: years of broad clinical experience.

Specification Two

Minimum Penetrating Areas—The long roots of natural teeth not only provide anchorage against pull, but are equipped to accept great vertical forces which are brought to bear on the occlusal surfaces of natural teeth. The greater the area which must be pushed through the bolus of food, the greater the force that will be required to do so. In denture teeth, therefore, the reduction of the penetrating areas to a minimum is indicated (Fig. 6).

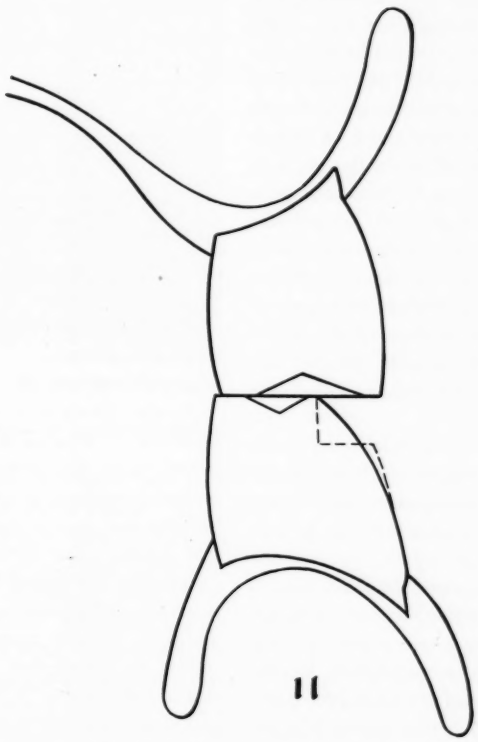
Specification Three

Small Flat Milling Areas—Experience indicates that mere chopping or cutting is not enough; it has been demonstrated that if masticating areas are placed lingually, or buccally and lingually (Fig. 7), the most efficient results are achieved.

Advantages—This type of structure permits (1) closure of the mandible with minimum stresses on the supporting tissue (Fig. 8), and (2) free lateral motion into position (Fig. 9) with the masticating areas coming into opposition in both right and left lateral motion. Thus the example of nature is followed as far as conditions permit, providing artificial dentures with anteriors which are primarily incisors, and posteriors that permit additional cutting and grinding.

Specification Four

Clearances or Escapes—Masticated food is permitted to leave the occlusal surfaces by means of clearances or escapes. If free clearances are not provided, the occlusal structure will become clogged and the action of the sharp cutters will be quickly blocked. This situation is comparable to the common "twist drill" used in drilling metals (Fig. 10). The clearance carries the drilled metal away, and if not provided, the drill meets increased resistance. Drilling cannot be con-



11. ***The two buccal outlines, one in solid black and the other in a dotted line, show two different structures which are functionally equivalent. The solid black outline is preferable, however, for esthetic reasons.***

tinued until the clogged material is cleared away.

Specification Five

A High Degree of Hardness and Wear Resistance—The material of which the teeth are made must have a high degree of hardness and the ability to resist wear in order to maintain easy cutting. Hard tools will cut with far greater efficiency than soft tools. Obviously the tools will not *remain sharp* unless they are wear resistant.

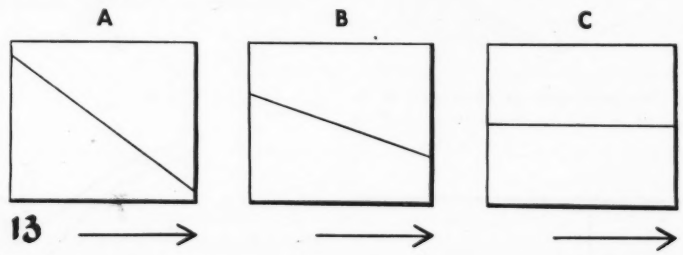
Primary Considerations—The five specifications described are considered fundamental. The first four were stated by the author more than twenty years ago. At that time all teeth were of porcelain; the fifth specification was therefore unnecessary. Since that time additional specifications have been developed. Two, pertaining to stabilization of dentures, are presented for consideration.

Stabilization, Specification A

Lingual Occlusal Contact—The occlusal contact of the lower teeth against the upper in centric should be in or within the median line of the ridge (Fig. 11). To achieve this result and at the same time retain maximum esthetics of the lower teeth, the lower teeth should have a fairly strong inward roll from the gingival third to the occlusal. The tooth form illustrated in Figure 11 permits the proper formation of the lower denture so that it will taper from the perimeter of the denture base upward to the occlusal surface of the tooth. This structure permits placing the load lingually to the center of the ridge.

Sufficient Occlusal Width Necessary—The buccolingual width of the occlusal of the lower teeth should not be too narrow. There should be sufficient occlusal width to provide proper "table room." It should be remembered that the purpose of reducing the stress on the supporting tissues has been accomplished by the second specification: minimum penetrating areas. For this reason it is not necessary to reduce the buccolingual width of the lower as much as is done with the anatomic type of tooth.

12. ***Illustrating wear of the buccal occlusal surface of lower first molars until they are in the same horizontal plane as the lingual occlusal cusps in a natural dentition.***



13. ***Illustrating the principle that horizontal planes offer least resistance to lateral motion.***

Stabilization, Specification B

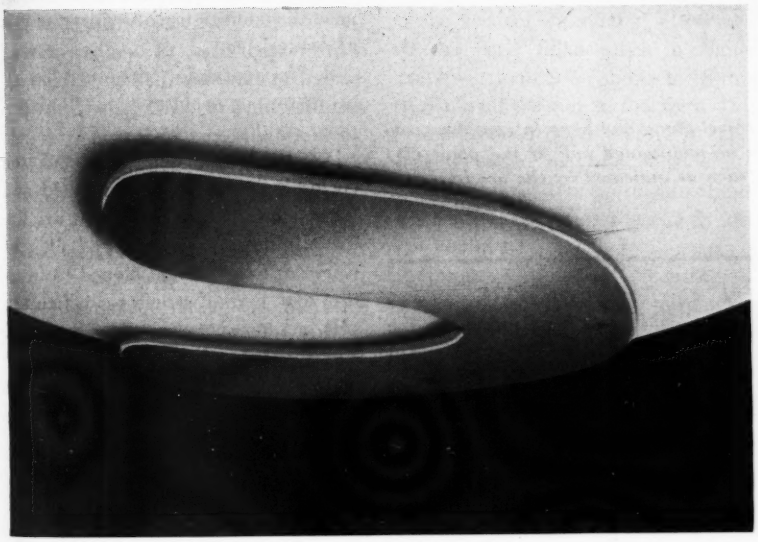
Harder Occlusal Contact in Mid-posterior Area—First suggested twenty years ago, this measure is intended to achieve greater stability of the dentures and to distribute resorption evenly. The bicuspid area was selected by the region of harder contact.[2] Specially constructed teeth were designed for this purpose. More recently, to accomplish the same and additional results, it has been suggested that the first molar area be the region of harder contact and that this be achieved by making the first molar of harder and more resistant material than the other teeth of the denture.[3]

Possible Origin of Problem—To obtain the maximum benefit from teeth embodying specifications 1 to 5, it is essential that they be properly set up. The writer believes that much of the marked difference in clinical results reported by various eminent prosthetists may arise from a considerable difference in the arrangement of the teeth and particularly with the nature of the occlusal plane. Two specifications are offered for the occlusal plane.

[2]Fish, E. W.: Principles of Full Denture Prosthesis, ed. 2. London, John Bales, Sons and Danielsson, Ltd., 1933.

[3]Sears, Victor H.: Specifications for Artificial Posterior Teeth, J. Prosthetic Dent. **2**:358 (May) 1952.

14. ***Showing conformation of lower denture to the surface of a sphere with a 4-inch radius.***



15. ***Show template adapted to a 4-inch radius arc.***

Occlusal Plane, Specification One

The plane of occlusion should be horizontal laterally. It is evident (1) that inclined planes can cause as much interference with lateral movement as interdigitating cusps, and (2) that the plane of least interference with lateral movement will be a plane horizontal transversely. This specification is a marked departure from the construction found in natural human teeth *before they have been subjected to considerable wear.*

Buccal Cusps Frequently Show More Wear than Lingual Cusps—It can be observed that in many uninterrupted natural dentitions which have been subjected to considerable wear, the buccal cusps have lost more by wear than the lingual cusps. If a straight edge is placed as shown in Figure 12, the buccal and lingual cusps of the right and left first molars will be in contact with the straight edge. The principle of occlusal plane interference is illustrated in Figure 13.

Plane of Occlusion Horizontal Laterally—Assume that the lower members in Figure 13 are pushed vertically upward with a force of ten pounds while at the same time force is exerted to move to the right, as indicated by the arrow. Obviously, the obstruction to motion is greatest in (A), less in (B), and least in (C). In the case of (C) there is only frictional resistance to lateral motion. From these facts it is deduced that the plane of occlusion should be horizontal laterally. Lateral inclines of the occlusal plane are inimical to an artificial dentition for the same reasons as are interdigitating cusps.

Occlusal Plane, Specification Two

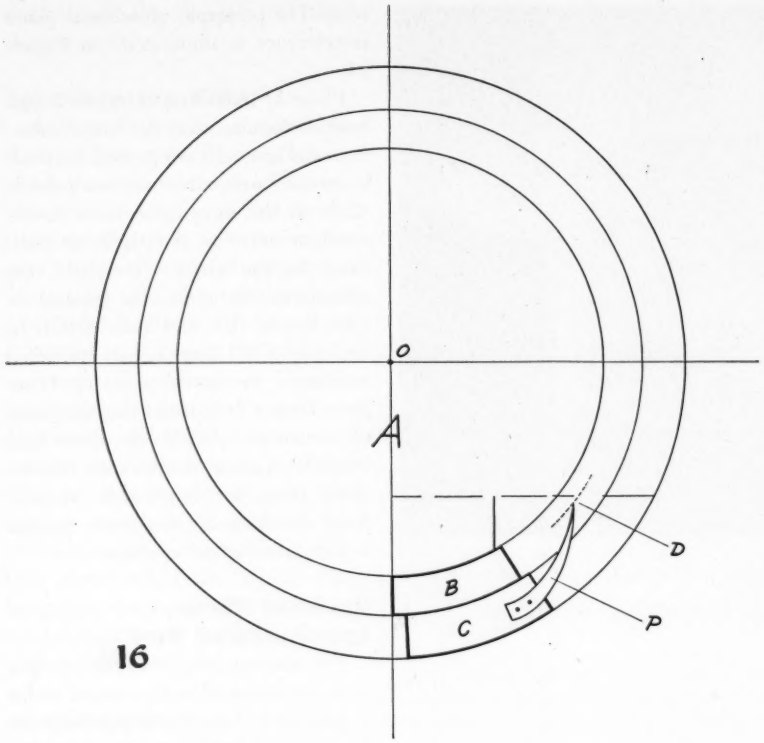
The anteroposterior Curve of Spee from the bicuspid to the second molar is indicated. Interdigitating cusps on the artificial teeth have been omitted from the specification because they are contraindicated in rootless teeth. The lateral inclination of the occlusal plane has been eliminated for the same reason. In artificial dentures, the basic support for the laterally inclined plane and the interdigitating cusps has been lost. This is not the case, however, with respect to the anteroposterior Curve of Spee.

Balanced Articulation in Natural Teeth—In the ideal, or approximately ideal, dentition the occlusal plane of lower teeth conforms closely to a section of a four-inch (more or less) sphere (Fig. 14).[4] This structure is considered necessary to balanced articulation in natural teeth.[5] Balanced articulation in natural teeth permits the use of equal force on each side during mastication.

Template Used—As shown in Figue 15, the template commonly used for the setup of anatomic teeth would accurately fit the surface of a sphere with a radius of approximately four inches. Note that this template has the anteroposterior inclined Curve of

[4]Boyle, Horace H.: Design of the Natural Dentition, London, Staples Press, Ltd., 1952, p. 35.

[5]Bonwill, W. G. A.: In American System of Dentistry, vol. 2, by Litch, W. S.: Philadelphia, Febiger Brothers, 1887.



16. ***The segment of the circle (C) will travel along and keep in complete contact with the circle (B). This contact can be maintained only if the point (D) remains in contact with a parallel circle, such as indicated by the arc in dotted lines.***

Spee, and also an inward and downward inclination laterally. It has been pointed out that the lateral inclination must be disposed of because the structures in the human dentition designed to cooperate with this inclination have been lost by the edentulous patient. However, no such cogent reason is found for eliminating the anteroposterior Curve of Spee. On the contrary, there are strong reasons for retaining this anatomic structure.

Functions of the Anteroposterior Curve—Completely balanced articulation is impossible without the anteroposterior curve which in the human dentition (1) serves to permit balanced articulation whether the teeth have cusps or not, and (2) serves to distribute the force of mastication properly over the posterior area.

Functions in Artificial Teeth—In the absence of cusps, the Curve of Spee serves to locate the mandible in direct closure, and by maintaining an habitual position of mastication, prevents the mandible from wandering forward. A properly positioned Curve of Spee is the only plane which will permit complete contact at every point from centric to the incising protrusive position (Fig. 16).

Summary

1. Nature requires that interdigitating teeth have long roots; the converse is clearly implied.

2. A number of fundamental specifications have been introduced to meet the conditions caused by the loss of natural teeth.

3. Nonanatomic teeth must be set up in proper occlusal plane for optimum results.

4. The lateral inclination of the occlusal plane is contraindicated and for much the same reasons as are the interdigitating cusps. However, the Curve of Spee was developed to function with certain structures which are still mainly present when artificial dentures are required.

5. For true balanced articulation and smooth, efficient function, the anteroposterior curve of the occlusal plane is required.

140 *Paulson Road.*

The Forms of Porcelain Posterior Teeth

(*Continued from pages* 62 *and* 64)

occlusal patterns are reproduced. All the teeth illustrated are lower first molars and the scale of reproduction is approximately the same for all.

Variations in Patterns

It will be noted that ideas on what constitutes a desirable occlusal pattern have fluctuated over the years. One conclusion, however, is inescapable: dentists and manufacturers were thinking about the design of occlusal surfaces at least a hundred years ago. They will continue to do so. Meanwhile, dentists can be grateful for the variety of types available.

P.O. Box 647.

SURGERY VS. BACTERIOLOGY

in Pulpless Tooth Management

PART TWO

PHILLIP M. CHERNOFF, D.D.S., Middletown, Conn.

DIGEST

In this installment of a four-part discussion of the advantages of the surgical technique in the treatment of pulpless teeth, the author surveys the subject of apicoectomy in application and presents the fundamental principles, fully documented, underlying this concept in the management of a difficult problem in dentistry.

The Rationale of Apicoectomy

The importance of a thorough knowledge of the anatomy of root canals must be emphasized as the rationale of apicoectomy derives from anatomic and histologic factors. The forms of root canals are not the simple cylindrical areaways that they appear to be in a clinical radiograph; they are complex in form, they vary in size, shape, and direction from crown to apex.

Root Canals not Always Cylindrical—The clinical radiographic examination provides only the labiolingual or buccolingual aspect and thus does not correctly interpret the canal forms.

Unfortunately, it is not possible to obtain a radiograph of the mesiodistal view in situ, but radiographing extracted teeth in the mesiodistal direction will demonstrate the fact that root canals are not always cylindrical but often are ribbon-like and of varying widths (Figs. 1, 2, and 3).

Entire Lumen of Canal Must be Thoroughly Filled—Irregularity of form in the canal makes a thorough condensation of the root filling imperative; the canal must be entirely filled in the lateral dimensions as well as the vertical. A canal is often considered well filled when a radiographic examination shows the filling to reach all the way to the apex. This is not necessarily a well-filled canal because there may be considerable discrepancy in the lateral directions. The entire lumen of the canal must be completely filled by means of thorough mechanical cleansing of the canal and thorough mechanical condensation of the root filling.

Lateral Component Frequently Neglected—Hatton, Skillen, and Moen[1] refer to the frequency with which the lateral component of canal filling is ignored: "Our specimens all direct attention to another type of incomplete filling that is not revealed by the roentgenogram; namely, the incomplete occupation of the full diameter of the canal by the filling material. We have mentioned this type of incomplete filling repeatedly and stressed its importance in the production of failures in treatment. This type of incomplete filling is so common as to be present in more than three-fourths of the teeth that we have examined. Indeed, the examination of root-filled teeth breeds anything but respect for the average practitioner's technique."

Additional Evidence—P. G. Puterbaugh[2] also stresses the importance of solidly filling the entire lumen of the canal in the following statement: "Serous exudate will accumulate in any portion of an unfilled canal, and, being diverted from normal circulatory channels undergoes decomposition, and sooner or later invites bacterial colonies to form chronic foci of infection."

Complex Anatomic Variations—Only in young people is the apical structure simple, consisting of a single apical foramen. In adult teeth the main canal is constricted at the apex but consists of many canals branching from the main canal outward to the periapical area. These finer apical canals and their foramina are not discernible in the clinical radiograph, but microscopically appear in relation to the main canal as branches from a tree trunk. This condition has been called "arborized" for that reason.

Ramifications Known to Exist—Many operators have demonstrated the existence of these finer apical ramifications and the subject is thoroughly covered by Hess[3] who deals extensively with what he describes variously as the "finer branches," the "apical ramifications," the "numerous ramifications in the form of fine canals at the apex of the root." The microscopic canals described were found to exist in the apical regions of between 70 and 80 per cent of all the teeth studied by numerous authors.

[1]Hatton, E. H.; Skillen, W. G.; and Moen, O. H.: Histologic Findings in Teeth with Treated and Filled Root Canals, J.A.D.A. **15**:59 (Jan.) 1928.

[2]Puterbaugh, P. G.: Root Canal Fillings Materials, J.A.D.A. **15**:244 (Feb.) 1928.

[3]Hess, W.: Anatomy of Root Canals, New York, William Wood & Company, 1928.

Mechanical Cleansing Impossible

1. According to Puterbaugh,[2] "Histologists have agreed that the proper site for severing a pulp is just within the apical foramen at the dentinocemental junction. This becomes a mechanical impossibility in those teeth having multiple foramina or small tortuous canals."

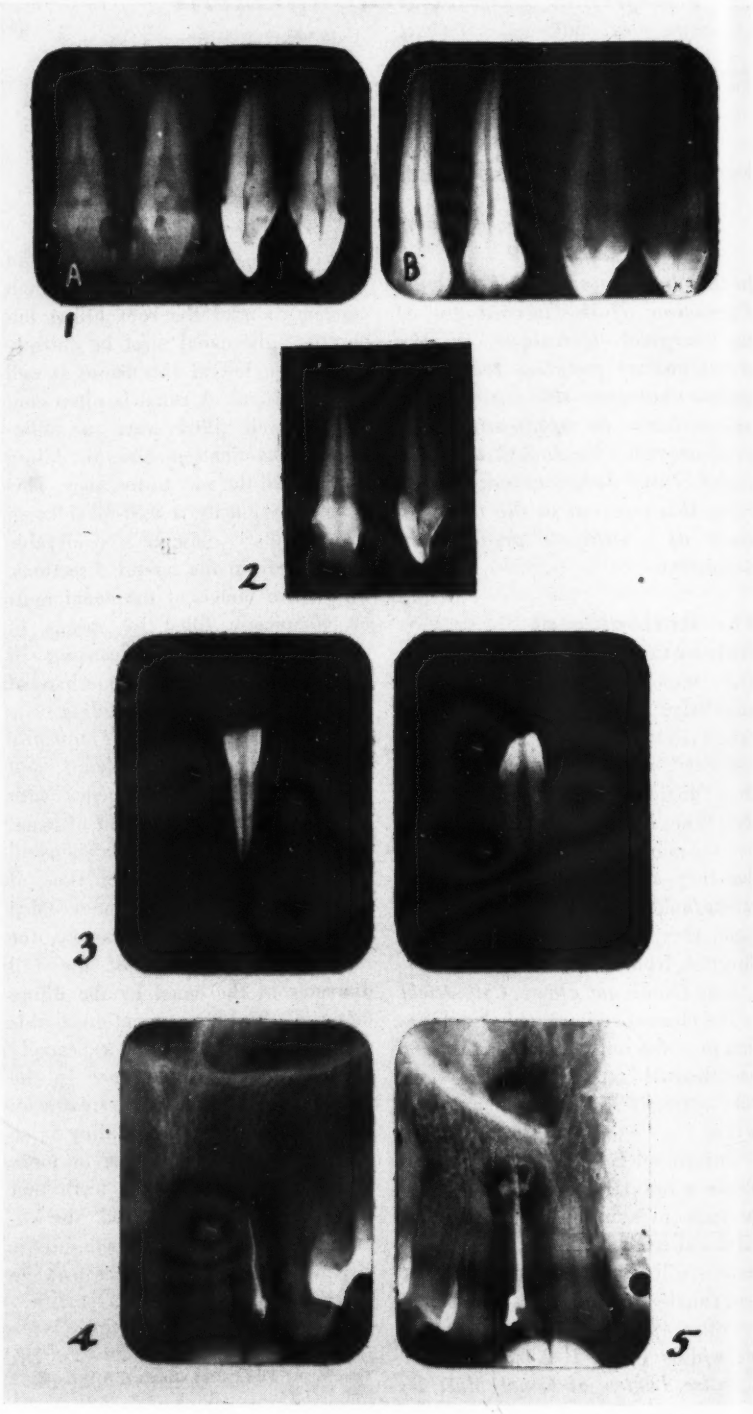
2. Blayney[4] states: "The number of apical foramina in a given tooth cannot be determined by any clinical method with which I am acquainted. From a microscopic study of root ends we well know that any tooth may have several openings to the periapical tissues, also that it is mechanically impossible to cleanse thoroughly and fill all of the accessory canals."

3. Blayney[5] comments in addition: "The study of the anatomy of the apical region clearly indicates that it is physically impossible to remove all the organic tissue within the apical canals. The tissue that is left in the apical portion of the main canal and all of its apical ramifications must be uninjured by drug action."

Average Treatment Insufficient—To the operator who has acquainted himself with the studies made of the anatomy and histology of the apical section of roots it is clear that the average treatment of pulpless teeth does not take into account the fundamental factors of apical root structure. It is impossible to remove the contents of the fine apical canaliculi; if they are not removed they become potential elements of degeneration with the attendant evil effects on the periapical tissues.

Apicoectomy Solves Problem—Surgical removal of the canal-riddled

[4]Blayney, J. R.: Diagnostic Deductions, J.A.D.A. **19**:766 (May) 1932.
[5]Blayney, J. R.: The Medicinal Treatment and the Filling of Root Canals, J.A.D.A. **15**:239 (Feb.) 1928.



1. ***Variations in root canal morphology are shown. (A) Centrals exhibiting canals that are wide mesiodistally and narrow labiolingually. (B) These cuspids have canals that are narrow mesiodistally and wide labiolingually.***

2. ***An upper central with a canal that appears to be straight in a labiolingual view but which is curved when viewed mesiodistally.***

3. ***A lower central incisor in the labiolingual view appears to have a thread-like canal but in a mesiodistal view it is shown to be like a ribbon.***

4. ***An underfilled canal with unsealed apex provides a breeding place for bacteria, causing periapical lesions.***

5. ***An overfilled canal. Filling material extending into the periapical area is a foreign body that may not be tolerated indefinitely.***

apex eliminates the potential source of future periapical disease.

Source of Periapical Destruction—Practitioners often wonder why an apparently well-treated and well-filled root develops a periapical lesion. The explanation is that without apicoectomy the elements of future destruction are allowed to remain in the canicular ramifications of the apex. Decomposition of the organic tissue within these canals and the products of degeneration are responsible for the periapical destruction that frequently follows the so-called "well-treated" case.

Frequent Result of Usual Technique—Because it is impossible to cleanse the finer apical canals, they cannot be properly filled. No amount of condensing the filling material at the apex can entirely replace the tissue left in the canals; at best, great pressures may force some of the organic tissue into the periapical area. Such a condition is admittedly undesirable, yet it is often the unintentional sequel to the usual filling technique.

Prevention of Periapical Reverse—An apicoectomy should be performed immediately after filling, or immediately before filling. In this way alone can the operator be sure that no objectionable elements are left to initiate a future periapical inflammatory reaction.

Apicoectomy Essential in all Cases—The organic tissue that may be forced out into the periapical region is not the only hazard of the ordinary root filling technique. The filling ingredient itself may be the cause of periapical reaction as a result of irritation. The impossibility of accurately controlling the placement of the root filling provides another reason for the use of apicoectomy in all cases.

Technique of Root Canal Filling

The importance has been mentioned of filling the canal solidly in its fullest diameter and it has been emphasized that incomplete filling in the lateral dimension results in failures. The vertical dimension also presents problems in the procedure of root fillings.

Problem of Vertical Dimension—It has been stated that the ideal level to which a root filling should be placed is at the dentinocemental junction. If the filling reaches the dentinocemental junction and is solidly condensed in the lateral direction, the dentinal tubules which permeate the dentine of the root are thoroughly sealed off from communication with the main canal. If the root filling does not reach the dentinocemental junction but leaves a part of the apical end of the canal unsealed, the following situations arise:

(1) Space is left for the accumulation of exudate.

(2) An ideal breeding place for bacteria is provided.

(3) Direct communication is permitted between the bacteria in the dentinal tubuli and the periapical tissues (Fig. 4).

Extruding Root Filling a Foreign Body—If the root filling extends beyond the dentinocemental junction, it may become a source of irritation either by itself, or as it is forced beyond the dentinocemental junction it may carry with it irritating elements from the canal. A root filling that extrudes from the apex is a foreign body (Fig. 5). Under the most favorable conditions bone may tolerate such a circumstance, but often will undergo suppuration and necrosis.

Overfilling not Desirable—In reviewing case histories, Coolidge[6] stated the following: "A comparison of the canals that are overfilled with those that appear to be filled to the foramen and those that are slightly underfilled over a period of years will demonstrate that overfilling is not desirable where healthy periapical tissue surrounds the root."

Irritation Accompanied by Proliferative Tissue Changes—"No matter what the cause," stated A. B. Crane,[7] "Irritation of the apical pericementum will be accompanied by proliferative tissue changes. This may amount to no more than a thickening of the tissues, or it may advance until a granuloma is produced. With the advance of tissue proliferation, a demonstrable granuloma becomes established. This may be a reparative effort or a chronic destructive process. In the latter event, the apical cementum will become denuded.

"It often happens that a sudden increase in bacterial activity or a decrease in tissue resistance will cause breaking down of the natural circumscribed line of defense which serves to retard the growth of the primary granuloma, and thus a diffuse proliferation will be established. Spikes of granulation tissue will penetrate into the adjacent bone, causing extensive rarefaction.

"Either cyst formation or extensive diffuse proliferation should discourage attempts at root canal treatment. If it were possible to discover in their incipiency the insidious changes which lead to the metamorphosis of the granuloma it is probable that many root canal ventures which now seem justifiable would be definitely contraindicated."

Possibility of Exact Filling of Root Canal—Referring to the difficulty of filling a root canal precisely to the dentinocemental junction, Weaver[8] states: "With this technique I find it impossible in many cases to keep from forcing excess material through the apical foramen."

Use of Measurement Controls—None of the techniques described for filling root canals with measurement controls has been accurate enough to warrant placing faith in the certainty of procuring a seal exactly to the dentinocemental junction.

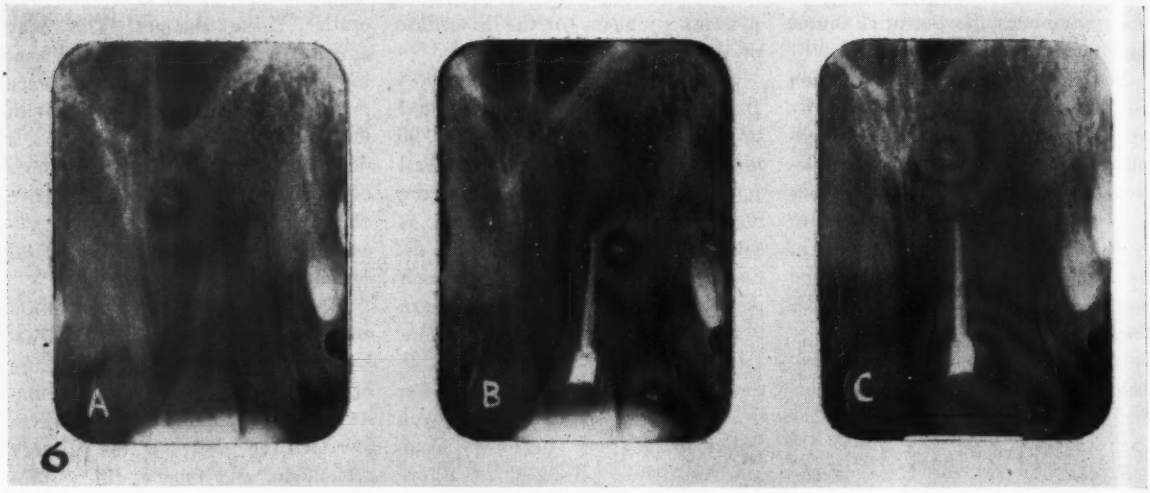
Blayney[5] advocates the measurement control technique but warns: "Care should be exercised to prevent overfilling. While it is not possible to avoid such a condition entirely, it can be reduced to the minimum by the use of the measurement control, as previously described."

Comment—The best that a measurement technique can do, therefore,

[6] Coolidge, E. D.: Dental Pulp Case Histories and Root Canal Filling Records, J.A.D.A. **15**:62 (Jan.) 1928.

[7] Crane, A. B.: Diagnosis Preceding Root Canal Treatment, J.A.D.A. **15**:236 (Feb.) 1928.

[8] Weaver, S. M.: Root Canal Treatment with Evidence of Histologic Repair, J.A.D.A. **35**:483 (Oct.) 1947.



6. ***(A) Periapical abscess involving more than half the length of the root. (B) Only the apical tip has been removed. The sides of the root were thoroughly curetted. (C) Healing is complete; bone and peridental membrane have completely regenerated.***

is to "reduce to a minimum" the likelihood of overfilling. An admission by an exponent of a measurement technique that it is "not possible to avoid such a condition entirely" is sufficient proof that operators have been relying too much on the element of chance.

Filling to Dentinocementum Junction Impossible—Balint Orban[9] stated: "I have obtained the practical operator's point of view concerning the possibility of removing pulps and filling root canals to the dentinocemental junction. The almost unanimous opinion was that this could seldom be accomplished through intent."

Evidence in Favor of Apicoectomy—Inasmuch as it is (1) impossible to cleanse all the finer apical canals, and as it is (2) impossible to fill the main canal exactly to the dentinocemental junction, and as it is (3) essential to remove all the elements that are potential factors of periapical disease, it is evident that apicoectomy is the direct and certain way to success in pulpless tooth management.

A Conservative Procedure

Only a small alveolar opening is necessary and only about 2 millimeters of the apex need be resected in any case. Only the canal-riddled tip that harbors in its microscopic network of channels the potential elements of disease and destruction must be resected; only the tip and no more.

Cementum not Permeable—It must be remembered that the cementum is not permeable. Bacteria cannot pass from the dentinal tubules through the cementum. Nor can passage be accomplished from the periradicular area into the tooth through the cementum.

Protective Wall Should be Conserved—The cementum is an impervious wall preventing communication either way. Therefore in no wise can it be considered a contributing factor in periradicular infection. On the contrary, it stands as an adamant bulwark protecting the root from infection when surrounded by a periradicular degeneration. This lateral protective wall should be preserved.

Only the Tip is Resected—In any case, only the tip of the apex, and no more, should be resected, no matter how extensive the periradicular involvement may be.

Former Theories Fallacious—1. The former teaching that resection of the root had to be made at the greatest limit of involvement was fallacious.

2. The statement continually encountered that "if more than one-third of the root is involved, apicoectomy is contraindicated," is untrue.

Misinformation Inherited—Without doubt it was once believed that as much of the root had to be amputated as was involved in the periradicular disease. It was reasoned that if more than one-third of the root were amputated there might be too little alveolar support left to warrant the effort to save the tooth.

These concepts have been accepted by others and handed down by teachers to students.

Conclusion

In experimenting in 1927 with cases of extensive periapical destruction the author discovered that if only the offending tip of the apex was removed and the periradicular area thoroughly cleansed (no matter how extensive) the bone and peridental membrane would regenerate (Fig. 6).

Immediately following apicoectomy the process of periapical tissue activity is one of regeneration, whereas, following root canal medication alone the periapical reaction is too often one of degeneration.

In view of this consideration apicoectomy should be employed as a first rather than as a last resort.

154 *Broad Street.*

[9]Orban, B.: Why Root Canals Should be Filled to the Dentinocemental Junction, J.A.D.A. **17**:1086 (June) 1930.

The EDITOR'S Page

FEW DAYS pass in the life of a dentist that he is not asked for an opinion concerning the role of chlorophyll products in mouth hygiene. The green coloring matter of plants has been added to paste and powder dentifrices; it is available in troche and mouthwash form, for use in controlling mouth odors. Has chlorophyll any merit in mouth hygiene?

A comprehensive review of the human uses of chlorophyll products has been made by Bartels[1] in a commendably conservative evaluation. These are among his statements:

1. The product used in oral preparations is not the material chlorophyll, but sodium copper chlorophyllin salt. Natural chlorophyll is oil soluble while the chlorophyllin salt is water soluble.

2. Infected wounds, as observed by Bowers "showed rapid disappearance of objectionable odors and remarkable cleanliness. Granulation tissue had a finer texture."

3. Although there is some basis for the deodorizing claims for chlorophyll when taken internally, well-controlled investigations have not been carried out and this subject is masked in confusion. Corwin[2] has pointed out "that the commercial product chlorophyll is not the chlorophyll of nature but a chemically different substance which may have a harmful effect on the human liver if taken in large quantities."

4. There is little evidence to substantiate the claims that chlorophyll when used locally has any long-time ability to reduce mouth odors, reduce the incidence of dental caries, or give important help in the control of periodontal disease.

Bartels reviews the work of other investigators as follows:

"Hein and Shafer report the results of addition of sodium copper chlorophyllin to mixtures of saliva and carbohydrates. Microbic fermentation of soluble starch was inhibited for 6 hours by 1:1000 dilution of chlorophyllin, while a 1:500 dilution was necessary to restrain bacterial fermentation of dextrose and sucrose. Mixtures without chlorophyll produced a pH 3.8-4.1 within 24 hours, whereas in the presence of chlorophyllin, a period of 96 hours was necessary for equivalent production of acid."

"Nevin and Bibby studied the effect of concentrations of water soluble chlorophyll derivatives on strains of lactobacillus, streptococcus, micrococcus, and microorganisms in pooled saliva. The water soluble chlorophyll, they report, is bacteriostatic for all organisms studied; the inhibition of respiration is roughly proportional to the concentration of the chlorophyll; and the glycolytic activity of the individual cell may be stimulated.

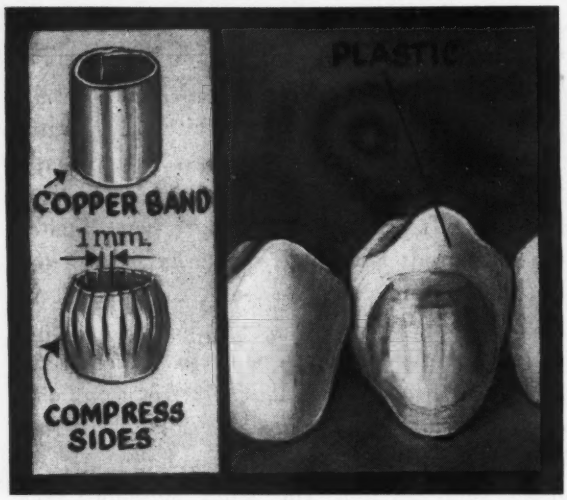
"McBride, on the other hand, devised a technic for determination of acid production whereby samples could be removed periodically from pure cultures of various species of lactobacilli. Different porphyrin compounds were tested including sodium copper chlorophyllin. The latter substance was found to inhibit acid production by L. casei; L. delbruckii, and a group F Streptococcus but stimulated acid production by L. arabinosus, L. leishmanii and Leuconostoc mesenteroides. McBride concludes, therefore, that the inhibition of acid production by the chlorophyllins is not a specific activity, but rather, a general property of several porphyrin compounds for certain types of organisms, whereas other types of acidogenic organisms are stimulated by these compounds.

"Shafer and Hein maintained hamsters on a cariogenic diet; the test animals were given water containing chlorophyllin, 1:500, while the control animals received just distilled water. In this limited series of animals a greater reduction in the mean caries score was indicated in those animals receiving the water containing the chlorophyll. No reductions in lactobacilli were found in counts taken at three different occasions. On the other hand, Shaw found that consumption of drinking water containing 0.2 or 0.5 per cent sodium copper chlorophyllin did not alter the occurrence nor rate of progress of carious lesions in caries susceptible white and cotton rats which were maintained on a caries-producing diet.

"Fosdick, Ludwick and Schantz in a study of enzyme inhibitors showed that penicillin, among a number of substances tested which included chlorophyllin, was the only substance which attached itself to the dental plaque and persisted in its inhibition of acid production for hours whereas the other materials were effective for only 20 to 30 minutes."

A judicious opinion would be that while there is some evidence of merit for products containing chlorophyll, the advertising claims in some cases have exceeded the scientific observations.

[1] Bartels, Henry A.: Chlorophyll. N.Y. D. J. **18**:376-386 (Oct.) 1952.
[2] Corwin, Alson H.: Address before the American Chemical Society, referred to in ADA News Letter **5**:2 (Dec. 15) 1952.



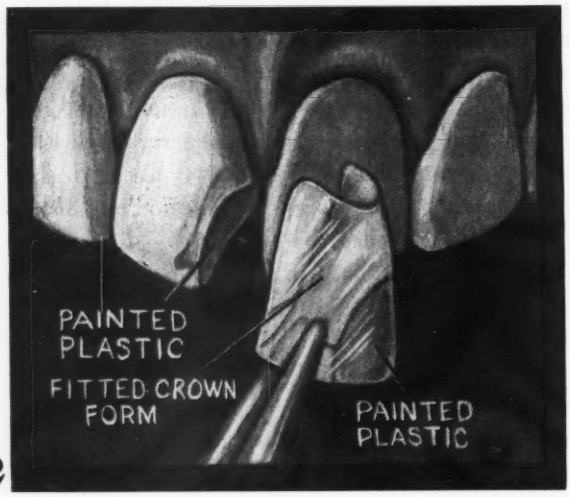
1

Clinical and Laborator

Construction of a Temporary Crown

Arthur Van Victor, D.D.S., East Detroit, Michigan

1. Contour and festoon a copper band of proper size. Shorten the band to extend no more than 2 millimeters beyond the occlusal surface of the preparation. Make longitudinal cuts 1 millimeter apart, using a curved scissors. Compress these pieces so that they overlap each other on the preparation. Cover the copper form with self-curing acrylic and carve to proper form.



2

Restoring Incisal Angles with Acrylic

Howard B. Josias, D.D.S., Poughkeepsie, N.Y.

2. Cut a crown form into longitudinal halves. Paint acrylic *alternately* into the cavity and into the corresponding part of the halved crown form. When the acrylic begins to lose its lustre, apply the crown form and allow it to remain in position until processing is completed.

3

Nonslip Cotton Rolls

Daniel C. De Arment, D.D.S., North Baltimore, Ohio

3. Pour the contents of a can of denture adhesive powder into a wide-mouthed jar that is half filled with cotton rolls. Shake the jar to distribute the powder among the rolls. The adhesive powder, when moistened by saliva, will prevent the rolls from slipping out of position.

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For every practical clinical or laboratory suggestion that is usable, DENTAL DIGEST will pay $10.00 on publication.

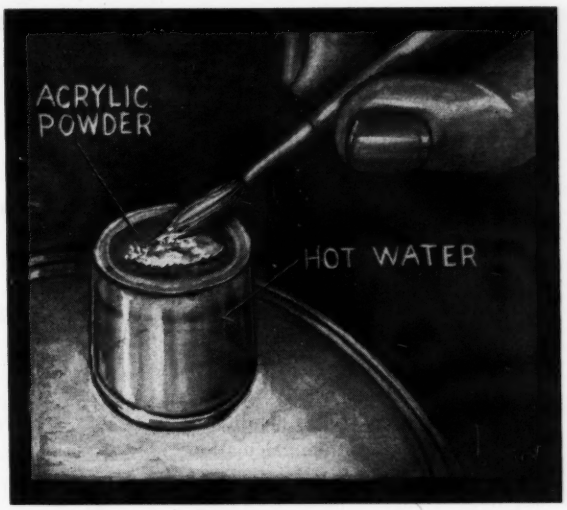
You do not have to write an article. Furnish us with rough drawings or sketches, from which we will make suitable illustrations; write a brief description of the

SUGGESTIONS . . .

Keeping Acrylic Polymer Warm

David Schwartz, D.D.S., Brooklyn, N.Y.

4. Fill a small porcelain jar with hot water. Return the lid to place and turn the jar bottom up on the bracket. Place the polymer on the jar. The hot water will keep the powder at the proper working temperature.



4

Covering Blood Stains on a Uniform

Ada Simon, Pittsburgh, Pa.

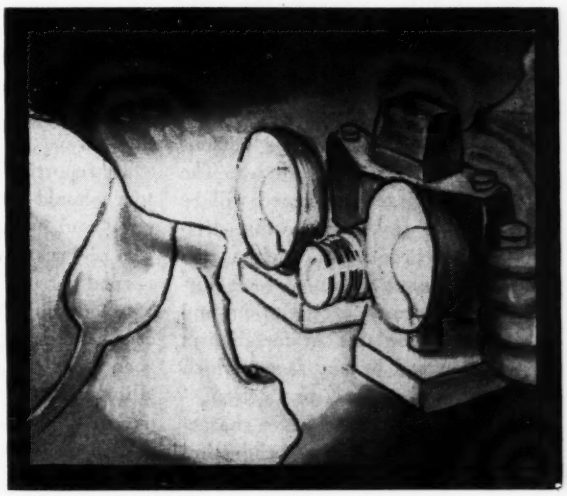
5. To cover blood spots on a uniform cut pieces of white gummed paper. Moisten and apply.

5

Clinical Photography

John H. Jeffrey, Kansas City, Mo.

6. When making clinical pictures, cover the patient's eyes with a day-sleeper's mask to prevent injury from the 1000-Watt lamp and to disguise the patient.



6

technique involved; and jot down the advantages of the technique. This shouldn't take ten minutes of your time. Turn to page 86 for a convenient form to use.

Send your ideas to: Clinical and Laboratory Suggestions Editor, DENTAL DIGEST, 708 Church Street, Evanston, Illinois.

MEDICINE and the Biologic Sciences

Basal Metabolism Test

Determination of the basal metabolism rate is still the most widely used single diagnostic tool in measuring thyroid function. This is true despite the fact that there are more accurate methods of measuring thyroid function available today.

The term "basal metabolism" implies a fixed index of heat production. While measurement of oxygen consumption under controlled conditions renders lower values than calculation without such standardization, even at best, clinical calorimetry cannot be considered a truly basal measure.

The metabolic rate is a measure of total heat production over a given period of time during the postabsorptive state and is most properly determined by direct calorimetry. Because of the technical difficulties of this procedure and for the reason that carbon dioxide production and oxygen consumption are accurate indexes of the amount of heat produced, measurement of gaseous exchange has proved both practical and accurate. Carbon dioxide readily diffuses from the blood into the alveolar air. Hyperventilation, therefore, occurring during the test will give grossly abnormal rates. Consequently, indirect calorimetry is best obtained by measuring the amount of oxygen utilized over a given period of time by a patient under a standard set of conditions.

The value is corrected for temperature, barometric pressure, and water vapor tension, converted to a caloric equivalent (4.8 calories is equal to 1 liter of oxygen), and reported in terms of per cent above or below the accepted normal values for persons of the same age, size, and sex. The amount of oxygen consumed will be increased by any influence that stimulates heat production, such as the specific dynamic action of food during the processes of digestion and absorption. The rate of metabolism will be lowered by any factor which results in lessened heat production.

Each normal person has a characteristic and uniform heat production as measured under standard conditions. Among different people variations may be of considerable degree even when the test is performed under the most exact conditions and with the most scrupulous technique.

It must be emphasized that the metabolic rate is a measure of total heat production and not solely of that energy produced by the calorigenic action of the thyroid hormone. Consequently, although the test has great merit in the evaluation of disorders of thyroid function, it is a "thyroid test" only in the sense that disturbances in heat production may be due, among other factors, to thyroid disease.

In reporting results, each laboratory should establish its own zero point and include this on the report. The observation that the majority of normal persons have a metabolic rate between plus 10 and minus 10 per cent should not obscure the fact that a considerable segment of the population has a greater or lesser rate of oxygen consumption. Neurasthenic patients show great variability in either direction and patients with low grade chronic illness tend to have low metabolic rates.

It is apparent that several conditions other than severe hypothyroidism may produce a material depression of the metabolic rate. Therefore, the test should be accepted only as an adjunct to clinical judgment.

Kyle, Laurence H.: Clinical Application of the Basal Metabolism Test, Med. Clin. North America **34**:1839-1851 (*November*) 1950.

Blood Sedimentation Rate —Importance

The red blood sedimentation rate is a simple yet effective method of detecting certain diseases. It is of value in recognizing the possible presence of hidden cancer or cryptogenic infections or for following the course of disease such as arthritis.

The test consists of putting a little blood with an anticoagulant into a long, narrow-lumened tube. The blood is then examined after one hour.

By ordering a measurement of the blood sedimentation rate the practitioner can save himself from making light of a soon-to-be fatal disease in many cases. Often the middle-aged man with a suspected neurosis may have cancer somewhere in his body. Often the test will quickly tell one that he is dealing with rheumatoid arthritis and not fibrositis or that the man who last week had a pain in his chest probably had a cardiac infarct. The girl thought to have a nervous diarrhea is shown to have a terminal ileitis or chronic ulcerative colitis.

The test is simple and not subject to error. The Westergren technique is frequently preferred because of the wide range between normal and abnormal. A reading up to 20 millimeters is usually normal. Figures around 36 millimeters are seen often in arthritis. Figures around 50 millimeters are common in rheumatoid arthritis or chronic ulcerative colitis. Cases of cancer give readings from 50 to 120 millimeters.

Only rarely does a patient with advanced cancer have a low blood sedi-

mentation rate. And only rarely does a patient have a rate of 50 millimeters or so for years without any demonstrable cause.

Editorial: Mod. Med. **20**:70 (*March* 1) 1952.

Boric Acid Poisoning

Boric acid and sodium borate when used in amounts commonly considered harmless have been known to cause severe illness and even death in infants and extremely young children. The material is readily absorbed by several routes. Unfortunately, the symptoms may be slight until a lethal or near lethal dose has been absorbed.

Usually the first indications of boric acid poisoning are nausea, vomiting, abdominal cramps, and diarrhea. Even though the boric acid has not been swallowed, gastrointestinal symptoms occur. Vomiting may become persistent and the vomitus usually contains blood. Also, the stools may be bloody.

Generally, an erythematous rash appears over most of the body. This may involve the pharynx and tympanic membranes. Extensive epidermal exfoliation may occur after several days. The reported conjunctivitis probably is the result of vascular dilatation rather than arising from inflammation.

With severe poisoning, shock develops, followed by a fall in blood pressure, tachycardia, and cyanosis. The temperature is most frequently reported as being subnormal or as high as 101 degrees Fahrenheit.

The patient may rapidly become stuporous and comatose. Convulsions are frequent and death appears to result from central nervous system depression if persons survive the initial shock. In such cases the patient may live for a week or more after the poisoning and no boric acid be found in the tissues after death.

Brooke, Clement, and Boggs, Thomas: Boric Acid Poisoning, Am. J. Dis. Child. **82**:465-472 (*October*) 1951.

Venous Thrombosis

Surgeons, internists, and obstetricians are giving considerable attention to venous thrombosis today. The problem of intravascular clotting is important as more and more of the physiology and pathology of the body are learned. With the ever-increasing elective invasion of heretofore unexplored surgical fields, the problem of postoperative thrombosis becomes even greater.

Routine postoperative examination of the lower extremities is a daily function of most surgical residents and surgeons. It should be routine for obstetricians and internists as well, especially in the elderly bedridden patient.

Much of the difficulty in the management of thromboembolism is due to the fact that diagnosis is frequently not established until serious embolic manifestations have arisen. Venous thrombosis and thromboembolism are so closely interrelated that they may be considered as one syndrome. Many authorities cite the following important diagnostic signs and symptoms as characteristic:

(1) Pain with or without tenderness over the calf muscles, malleoli, or plantar surfaces; (2) pain on dorsiflexion of the foot with the leg extended; (3) swelling of the leg; (4) unexplained rise in pulse or temperature; (5) chest pain with or without cough or bloody expectoration; (6) apprehension, pallor, nervousness or a "feeling of impending disaster"; (7) cyanosis of the legs; (8) temperature differences in the legs; and (9) the sentinel veins of Pratt.

Another fairly constant, simple, and early sign is the marked diminution or even absence of the femoral pulse in the affected extremity. This is noted particularly on palpating the femoral pulse preparatory to vein ligation. This phenomenon is invariably present even in the absence of other appreciable signs or symptoms.

The physiologic mechanism for the sign may be understood when one considers the marked and early angiospasm that attends all vascular accidents to any extremity, regardless of the location of the thrombus. The change in the femoral pulse occurs early in both thrombophlebitis and phlebothrombosis, long before there is any demonstrable edema or swelling. This sign has the additional advantage of being apparent without the aid of any apparatus. Observation of the femoral pulse should be part of the daily postoperative routine.

D'Alessandro, Arthur J.: An Early Clinical Sign of Venous Thrombosis, J.A.M.A. **147**:1759-1760 (*December*) 1951.

Urinary Calculi

Despite all known preventive measures, renal stones are prone to recur after excision and to increase in size. The treatment most commonly employed attempts to reduce urinary phosphate precipitation by continuous acidification of the urine.

This treatment is often limited in effectiveness by the presence of ammonia-forming organisms in the urinary tract and impairment of renal function. Under such circumstances a highly acidifying regimen is hazardous because of the danger of acidosis.

In many patients with urinary infection no amount of acidification will reduce the urinary pH to the desired acid range.

It has been shown that alumina gel causes reduction in urinary inorganic phosphorus and increases excretion of phosphate in the stool of normal subjects and those with stones. Aluminum hydroxide gel (amphojel®) with magnesium trisilicate has been used for this purpose quite frequently.

There is no evidence of decalcification of the skeleton or other ill effects. It appears that the phosphate is diverted through the gut thus partially relieving the kidney. This may be of value in uremia by facilitating excretion of urea with reduction of serum urea nitrogen.

Many patients do better with aluminum carbonate gel (basaljel®). This reduces urinary phosphorus excretion to lower levels than those obtained with aluminum hydroxide gel

alone or combined with magnesium trisilicate. Also it is found to be more palatable.

Therefore it appears that the aluminum carbonate gel is the drug of choice for prophylaxis of calculi in the urinary tract. Experiments suggest that a high urinary magnesium level may increase solubility of the calcium oxalate and maintain all calcium in solution. It appears advisable for stone-forming patients to take a diet adequate in magnesium to reduce endogenous oxalic acid excretion to a minimum.

Barrett, G. S.: Influence of Alumina Gels in Prevention of Urinary Calculi, J. Urol. **66**:315-331 (*September*) 1951.

Local Anesthetics—Toxic Reactions

Most untoward effects of local anesthesia arise from overdosage and not from sensitivity. Adverse reactions may follow: (1) too rapid injection, (2) quick absorption from a highly vascular site, or (3) inadvertent entry into a vessel.

Any agent is potentially toxic. Various parts of the body are first stimulated, then depressed in different degrees at the same time or in succession. Three classes of reactions are noted:

(1) In normal persons the central nervous system is affected, particularly the cerebral cortex or medulla, including respiratory and vasomotor centers. The drug may also act directly on the heart or vascular bed.

(2) A few persons have abnormal responses loosely described as allergy, hypersensitivity, or idiosyncracy.

(3) Certain vasodepressor or psychomotor effects are purely psychologic such as fainting at the sight of the needle.

Drug tolerance varies with different people. Therefore, the previous experience should be known and, if hypersensitivity is suspected, general anesthesia or a different local compound should be used. Metabolic factors must be considered and dosage is reduced with old age, debility, or shock.

Mucous membranes of the mouth, throat, and lower respiratory and digestive tracts absorb fluids rapidly. Excess solution should never be swallowed or inhaled.

Stimulation of the central nervous system may cause anxiety, loquacity, nervousness, tremors, or clonic convulsions. As a precautionary measure, short-acting barbiturates should be injected about two hours before anesthesia. If anesthesia is exciting a small dose of barbiturate is repeated and oxygen administered to prevent medullary depression. For outright convulsions ultrarapid sedatives are injected by vein at once, but slowly, with close observation of pulse and blood pressure.

Central nervous depression is always preceded or accompanied by some stimulation, however brief and slight. Speech fails, then consciousness, muscles relax, and breathing may cease.

Of the abnormal responses, allergic forms are primarily skin eruptions such as hives or angioneurotic edema. Contact dermatitis results from anesthetic ointments. Sometimes the hands of dentists who handle anesthetic solutions are affected.

Hypersensitivity and idiosyncracy produce common or bizarre effects after very small doses. Treatment de-

pends on symptoms. Incidental psychomotor reactions to the anesthetic procedure aside from the drug may be prevented by preliminary reassurance and sedation.

Epinephrine added to local anesthetics retards absorption but may cause reactions ranging from nervousness to ventricular fibrillation and death. Amounts should be small and solutions dilute, such as 1:200,000 or 5 minims of 1:1,000 solution to 100 cubic centimeters of procaine. Intense vasoconstriction is not advisable for patients with coronary disease, hyperthyroidism, or vasolability.

Sadove, Max S.; Wyant, Gordon M.; Gittelson, Lloyd A.; and Kretchner, Henry E.: Classification and Management of Reactions to Local Anesthetic Agents, J.A.M.A. **148**:17-22 (*January* 7) 1952.

Fetal Deaths

More children die in the first month of life than during all other periods. The day of birth is the most dangerous ever faced in the average life.

About seven per cent of babies are delivered before term. And about two-thirds of the deaths occur in this group. Therefore, it is apparent that the total loss can be reduced by avoiding prematurity.

The maternal death rate in the United States is less than 1 in 1,000 and for many states as low as 0.4 per 1,000. However, 1 in 20 mothers endure pregnancy without the reward of a living child.

Each year about 150,000 babies die; 50 per cent before birth and 50 per cent soon afterward. Prenatal and natal causes are responsible in 90 per cent of the cases.

The hope of survival is geometrically proportional to weight. More than 100 grams weekly is gained during the last two months of gestation. If the physician can prolong pregnancy until after the twenty-eighth week, the baby's chances improve by 25 to 50 per cent. A single week can mean life or death.

Infants under 1,500 grams are 1.4 per cent of the total number born but account for 36.9 per cent of fetal and neonatal deaths. Fully 78 per cent of this weight class die, more than half within the first twenty-four hours.

Babies between 1,500 and 2,500 grams represent 6.8 per cent of deliveries but 29 per cent of fatal results. However, only 15 per cent of this weight group succumb and the proportion can probably be reduced further.

Most stillbirths are directly related to maternal complications. Almost half are due to anoxia from placenta previa, early separation of the placenta, or cord complications. About one-tenth result from trauma, usually with intracranial hemorrhage.

Congenital anomaly or erythroblastosis is responsible for 17.5 per cent of cases, maternal infection or toxemia for a small proportion, and no obvious cause but prematurity in 16.8 per cent.

Of the deaths after birth, roughly one-fifth are caused by congenital anomalies and almost as many by trauma with intracranial bleeding.

Cesarean section should rarely be done for the sake of the child. In the group with weight above 2,000 grams delivered by section, mortality is 8 times the rate for those born by the vaginal route. Toxemia of pregnancy interferes with infant survival only to the extent that the number of premature deliveries is increased.

A passive attitude can no longer be taken toward congenital anomalies. The effects of maternal rubella and dietary deficiency are now recognized. The private practitioner who is familiar with the mother's prenatal course may discover other preventable influences.

Simpson, John W., and Geppert Leo J.: The Responsibility of the Obstetrician to the Fetus, Am. J. Obst. & Gynec. **62**:1062-1070 (*November*) 1951.

Syphilis Treatment

There are five general types of syphilitic cases with relation to treat-

CLINICAL AND LABORATORY SUGGESTIONS

(*See pages 76 and 77*)

Form to be Used by Contributors

To: Clinical and Laboratory Suggestions Editor

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708 Church Street
Evanston, Illinois

From: _____

_____

Subject: _____

Explanation of Procedure:

Sketch:

Suggestions submitted cannot be acknowledged or returned.

$10 will be paid on publication for each suggestion that is used.

ment. These are: (1) patients with questionable diagnosis of acquired syphilis, (2) those who have had sexual contact with persons with proved early infectious syphilis, (3) seropositive pregnant women, (4) false positive reactors, and (5) treatment failures.

It is important in every case of suspected acquired syphilitic infection that a careful evaluation of the case be made at the outset. This should include the clinical and laboratory studies necessary to establish or exclude the diagnosis of acquired syphilis. Such a procedure may prevent unnecessary psychic trauma, hypochondriasis, and syphilophobia.

About half of the sexual contacts of persons with proved early infectious lesions eventually have the disease. An injection of not less than 2,400,000 units of penicillin during the incubation period will prevent the development of syphilis in almost every case. In handling these cases the physician should assume that the patient has acquired the disease and thus enforce reexamination.

In the absence of other evidence of syphilis, the seropositive pregnant woman should be informed that she does not necessarily have the disease. However, treatment should be administered for the protection of the baby. A single injection of 300,000 units even in the twenty-four hours before birth allows placental transfer of the antibiotic to the fetus.

Some persons with positive serology uncorroborated by any clinical or anamnestic evidence of syphilis are actually false positive reactors. All seropositive reactors should be carefully investigated in an attempt to establish or refute a diagnosis of latent syphilis before the administration of antiluetic therapy is started.

Treatment is best withheld for three to six months to give the patient an opportunity to revert to seronegativity.

Some persons show persistently positive serologic reactions in tests for syphilis or increasing titers after treatment for an original acquired infection. They should be carefully questioned and examined so that dif-

ferentiation may be made between serologic relapse, asymptomatic reinfection, and biologic false positive reactions before treatment.

Rein, Charles R.: Problems in Syphilis Management, Tenth Annual Meeting of the American Academy of Dermatology and Syphilology, Chicago, 1951.

Pregnancy after Forty

From the moment of conception the infant born of parents past forty has an environment different from that which he might have had 20 years earlier. The fetus is more apt to share his uterine covering with fibromyomata at this late period in the human reproductive period. His attitude is more inclined to be influenced by such a condition as a relaxed abdominal wall. Also, his mother has had a greater opportunity to develop thyroid disease, changes in her cardiovascular system, or even cancer.

Embryonic and fetal development may be influenced directly by local pelvic pathology or indirectly by conditions of a systemic nature. During the two decades in which he might have been born the infant's parents have had a greater span of emotional experience. Their earning powers have changed. In fact, the entire world into which the new baby is born is different. In many respects the infant has post-mature parents.

The peak of reproductive capacity, as well as the time of greatest obstetrical safety, occurs in mothers between the ages of 20 and 24. It is six times safer for a woman to bear a child during the period of 20 to 24 years than it is between the years 40 to 44. After 45 maternal mortality is nine times greater than in the age group of 20 - 24. However, this should cause little alarm as all mothers in the United States past 40 have a better than 200 to 1 chance of survival in childbirth. Modern medical and surgical science have made death as a result of pregnancy at any age a rarity.

In the healthy patient with a good emotional balance late gestation is often accompanied by a feeling of rejuvenation. Pregnancy is a stimulating, growth-producing process associated with young adult life. Steroid hormone levels are high; they have an anabolic action. Quite frequently thyroid medication is used to accelerate metabolism but this drug also has a strong catabolic effect which is not tolerated too well by the older patient. Thyroid tablets should be reserved for those patients who have a deficiency in thyroid function.

The patient and her obstetrician place a high premium upon a living infant. Both need confidence to carry them through the last few waiting weeks of pregnancy. In an uncomplicated pregnancy, delivery should be as near normal as circumstances permit.

Parks, John: Pregnancy after Forty, Geriatrics **6**:399-403 (*November-December*) 1951.

Contra-Angles

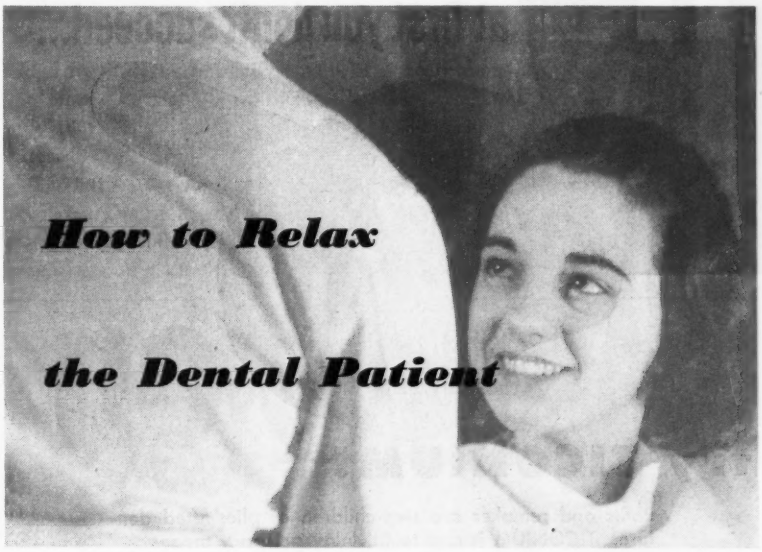
"A Negative Appetite for Activity"

Every parent has watched his child run like a wild gazelle, zipper up a tree like a chimpanzee, cut through the water like a porpoise—then be too tired to wash his face and much too tired to do any household chores. The child watching his parents might see the same pattern of behavior; the father full of vim on the tennis court and vigor on the dance floor, but too weary to shovel snow or cut the grass. The child might never recognize his energetic mother walking miles on the golf course, but much too fatigued to carry a bottle of milk from the store two blocks away.

Although getting tired is a matter of using one's muscles too much, fatigue also comes from using one's nerves too hard. Emotional or nervous fatigue is distressing and carries the descriptive word enervating. Physical tiredness that comes at the end of an out-of-door day is a pleasant sensation. Nervous fatigue carries overtones of tension, of strange rumblings and upheavals within one's internal structures. Physical tiredness is entirely superficial and seems to involve muscles exclusively. Nervous fatigue is not conducive to easy sleep. Physical tiredness is nature's most beneficent sedation.

Many of our patients express their anxiety over the dental appointment. Some of these same persons also complain of excessive fatigue. The two conditions are often found hand-in-hand among nervous patients. Undue anxieties, fussing too much over little things, and excessive overwhelming fatigue may give us important clues to the underlying personality structures of our dental patients. On this subject two psychiatrists, Doctor Shands and Doctor Finesinger have

In your ORAL HYGIENE this month



Do you suffer from tenseness and fatigue? Perhaps you've "caught" anxiety, as you might catch a cold, from one of your patients. If this idea seems far-fetched, try a simple experiment. Read Doctor R. M. Weber's article, "How to Relax the Dental Patient," put into practice as many of his suggestions as you can, and then note the lessening of your own feeling of tension. The time and effort you invest in helping the patient to relax, and making dental treatment easier to tolerate, will pay extremely high dividends to both your patient and yourself.

★ ★ ★

The hundred-dollar award is presented this month to Doctor S. J. Levy for his excellent article, "That Moot Question—Is There a Business Side to Dentistry?" In answering his own question, Doctor Levy explains the failure of some programs of business training for the dentist, and suggests ways in which the individual practitioner may find the answers to his own particular problems.

★ ★ ★

Thomas S. Eader, who died last December, after 70 years of practice, was known to dentists as the "Grandfather of Dentistry."

How had he earned this title of affection and respect? Not only by years of service to his profession—he founded both a dental clinic and a dental society—but by his alert, continuing interest in the progress of dentistry. He said: "I've gone to school every day of my life. I've given every hour I could spare to keeping abreast of major developments. In a fast-developing science, you know, the practitioner who doesn't grow with his profession soon becomes as obsolete as yesterday's procedures."

Young dentists might do well to repeat that last sentence to themselves every time they're tempted to say, "I'm too tired to study in the evening and too busy to attend dental meetings."

★ ★ ★

In discussing "The Overlap in Dental Practice," Doctor Louis H. Guernsey clarifies a point that may have troubled many a dentist: Just where does dentistry stop and medicine begin?

★ ★ ★

John Y. Beaty suggests that "Rental Homes May be a Good Investment" for the dentist.

★ ★ ★

"If You Forget to Remember," read Charles P. Fitz Patrick's article on the subject.

★ ★ ★

And don't miss "Your Son and Your Profession"—even if all of your "sons" are daughters.

written in *Psychosomatic Medicine*:

"The feeling of fatigue appears as one of the danger signals which announce that something is wrong; it is primarily in the service of self-preservation, and its function is to indicate that some activity or attitude has been persisted in too long or too intensely. We may note here parenthetically that certain impulses may be so intense as immediately to be the occasion for the fatigue signal; for instance, one of our patients felt completely exhausted when he saw his wife at night, and upon investigation, it developed that his immediate fantasy on seeing her was a murderous one, blocked and replaced at once by the feeling of tiredness. Looked at in this way, and placed beside the other familiar danger signal of anxiety, we can see an inverse relationship between the two. Where anxiety says to the individual in a vague and diffuse way: 'Something must be done,' so does fatigue say similarly: 'Something must be stopped.' In both cases, the signal is one which operates blindly, and it is left to the activity of the more discriminating perceptual mechanisms to find what it is that must be done or stopped . . .

"Our conclusion from this material is that fatigue functions in the patients we have seen as a psychoneurotic symptom. It is a basic symptom as important as is anxiety, and in some ways is reciprocally related to anxiety. The biological function of the feeling is that of a danger signal which protects the organism from injury through too great activity of any part of the body; in disease of other types the same symptom is a signal to avoid all activity which might impair the reparative mechanisms of the body; and in relation to the social environment of the civilized human being, the same signal operates to warn of a danger which threatens the social self, the individual's concept of himself in relation to his fellows and to the ideal image of himself embodied in his conscience."

Psychiatrists are not without their own brand of humor. Two of them, Doctors Whiting and English, have defined fatigue as a "negative appetite for activity." Most of us on many occasions have been filled with this negative appetite, particularly on a rainy morning after a hard night when our first patient is a fellow sufferer from the two-headed syndrome of anxiety and fatigue. On such an occasion misery does not have an affection for companionship with another person in misery.

"The Line Forms on the Left"

This is a university town, Evanston, Illinois. On our streets are many bright young faces. We have our just proportion of adolescent acne and a full share of bobby soxers. Most of the boys have their military service ahead of them. Many of the girls will be among our young widows, the mothers of the children of our fallen soldiers. These are morbid thoughts, ones that many of these young people face with utter honesty.

Most of the teachers of these fine young people in this town and in other hundreds of college towns in the USA are stalwart people. Some

are the inspirers of young minds and hearts. Some exert tremendous influence for great good; more powerful in many cases than the influence exerted by parents. A few teachers, regrettably, are despoilers of young minds and eager hopes. These are the cynics, the materialists, the moral lepers. Their most sinister doctrine is the doctrine of liberalism, collectivism, emancipation from any kind of authority or restraint except that exerted by the chilling hand of the state. Whoever stands forth against this new liberalism is called a fossil and an enemy of progress. Many good people have been silenced and refuse to speak their minds from fear of these "liberals."

Anyone who wants an answer to throw back in the teeth of the collectivists will find it an article, "The Propaganda Program of our Academic Hucksters," by E. Merrill Root in the December 1952 issue of the *American Legion Magazine*. Professor Root of Earlham College shows that today's badge of liberalism is in fact reactionism of the most ancient kind:

"The pity of it—the irony of ironies—is that the dominant collectivist professors spread the illusion that such reactionary dogmas and lies are 'liberal,' 'progressive,' 'revolutionary' —whereas they constitute the world's most terrible reaction toward the brute force and intellectual night out of which the soul of man has struggled through the ages. Communism (the militant spearhead of collectivism) is the most reactionary conspiracy against man that the world has ever known. It turns the clock further back than Hitler ever dared or wished. It erases Magna Charta; it abrogates what the American Revolution of 1776 won with blood, sweat, and tears; it reverses the Civil War, restoring a vastly more terrible version of slavery. All man has won in his age-long war with the Big Shots of the world, communism tramples under foot. The right of habeas corpus, of a trial by a jury of one's peers, of freedom from arrest and seizure without due process of law, of free press and free speech, of labor unions (the Soviet version is the *company union*), of striking, of the fruit of one's own labor, of movement at will and choice of one's job, are casualties of communism. Young men and women, when taught by the cynical Old Men of the Left that such reaction is 'revolutionary,' that such dogmatism is 'liberal,' are being deluded by the slick publicity agents of the most convenient lie into the illusion that lead is gold and geese are eagles."

The leftists are not only on college faculties. They may also be found in the editorial chairs of newspapers and magazines. We know that they have infiltrated the offices of federal government. Some stand convicted and are locked behind bars. Many are still on government payrolls. They are in motion pictures, they appear on television, they are the pampered pets of the great funds and foundations. Read about them again from Professor Root's article:

"Today the safety, the money, the prestige, the glittering prizes, go only to those who are collectivist. For success and a place in the sun—*the line forms on the Left*. The two great New York papers that influence Ameri-

cans to a paramount degree, the great magazines (from *The Atlantic* through *The New Yorker* and on to *The Saturday Review*) ignore or crucify those who do not subscribe to the cultural Left. If you are collectivist, the capitalists will hire you, the great corporations will use you on their broadcasts, the great foundations will support and push you, you will make friends and influence people. All you need do is to conform to the prevailing fallacies and bow down to the Devil (who, as Goethe wisely knew, is always 'the Spirit that *denies*'). The very government in Washington, that allegedly fights communism, will like you much better if you move meekly toward the slowly jelling collectivism of the cultural Left. How long will youth be lulled into conformity and drift on this dull tide of false orthodoxy?

"Youth is always for the underdog, always against the Big Shots. Youth loves to live dangerously. How then can youth today consent any longer to follow the Pied Pipers of the Left, the Jockeys of the Trojan Horse, into the status quo of collectivism? The great Garibaldi offered the youth of Italy 'only poverty and wounds and death and liberty'—and they thronged to his banner. Youth (if I do not overestimate its gallantry) will prefer to be lonely and poor with Whitman, to be poor and lonely with Thoreau, rather than to serve the bosses of communism, the hucksters of collectivism.

"Yet today the political and cultural Left always conditions and usually dominates American colleges. The grim and narrow dogmas of the New Puritanism—'Social planning,' 'economic determinism,' 'realism,' secularism, the subordination of man to mass, the destruction of spiritual values, such as truth and justice (with the substitution of convenience and expediency), the demand for ever increasing controls by the total state, are (in a far too great number and proportion of American colleges) assumed as axioms of what is 'progressive' and 'liberal.' The 'right' to uphold these intolerantly reactionary dogmas without criticism, ironically

called 'academic freedom,' is today destroying American freedom. The cultural Left insists that 'academic freedom' means its own monopoly of all guidance, all power, all freedom in its own hands. Parents must not object; if bewildered students question, they are dunked in wise-cracks and ridiculed as 'naive'; if professors protest, the acid of mockery is tossed in their eyes. Every freedom of dissent, whether at Pasadena or Poughkeepsie, the cultural Left brushes aside as a 'threat to freedom,' while it tramples liberty under its hoof."

The people who read Professor Root's article in the *American Legion Magazine* are the veterans of the nation's wars. So far as I know, no member of the American Legion has ever been accused of communist leanings. The audience of veterans that was reached by Mr. Root's important article is a group of readers who are in agreement with his point of view. A larger audience should be made available to receive this information; people who have never heard the sordid story of the new orthodoxy. If Mr. Root's keen cutting dissection of the academic hucksters is not exposed to a larger circle of readers it will be because the "line forms to the Left" in many of the editorial offices of the country.

I have learned that Mr. Root is a poet and a Quaker—both admirable qualities—added to a man of courage.

— E.J.R.

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